

A BOOK

Electrical Apparatus

AND SOME OTHER THINGS

For comfort, convenience, amusement and instruction for the home and workshop and for young and old.

"A Little Better than the Best"

MANUFACTURED BY

CLAPP-EASTHAM COMPANY

AND OTHERS



CLAPP-EASTHAM COMPANY

139 MAIN STREET, CAMBRIDGE, MASS.



Friends, Americans, Countrymen; Lend Us Your Ears!

If you are a wide awake American, whether man, woman, or child, you unconsciously use electricity many times every day. An electric bell may waken you in the morning, electricity may cook your morning toast or coffee, an electric car probably carries you down town, the elevator in your office also derives its power from an electric motor, your telephone, your automobile, your lights, your fan, in fact, almost everything associated with energy or motion derives its spark of life from the invisible magic of electricity.

We are sending you this catalog with the wish that you will derive much pleasure from its reading and will be interested in and proud of the representative American products which we have gathered together. We hope you will find some things at least which will lighten the burden of your duties, or which will give pleasure, amusement, or instruction. Many of these devices will add to the comfort or pleasure of the entire family.

Gifts.

As a gift at the holiday season or on the occasion of a birthday anniversary or wedding, nothing will be more acceptable, more useful or more appreciated than something electrical, nothing will cause the giver to be as long remembered.

Quality.

We list only devices of the highest grade afforded by the American market, and while these are sold at prices as low as are consistent with quality they are not of cheap construction or built only to sell at a price in competition with so-called mail order houses, and you will never be ashamed to acknowledge that your purchase was made from the Clapp-Eastham Company.

Responsibility.

We are ourselves primarily manufacturers of electrical apparatus and have been established in Boston and Cambridge since 1906. As manufacturers we are well known to the electrical trade throughout the country. Our reputation for fair dealing and for reliability is known to about ten thousand customers not only in this country but in all parts of the world. We are rated by all Mercantile Agencies and can refer, by permission, to the Boylston National Bank, Boston, Mass.

Our Guarantee. Read It!

We guarantee all material sold by us to be exactly as represented and to give satisfaction to the purchaser.

We guarantee all material to be free from imperfections or defects and against electrical or mechanical breakdown not due to misuse or abuse.

This guarantee means that any article which upon examination does not come up to your expectations may be returned to us and we will either exchange for other goods or your money will be refunded provided the articles have not been rendered unsalable by use.

Cooking devices and other articles likely to show signs of use cannot be returned except in a new condition. After being used by the purchaser our guarantee is limited to repairing the article or placing it in such condition as will make uit satisfactory for the purpose for which it was intended.

The only exception to the above guarantee is on lamps and batteries on which we can make no guarantee whatever as their life, by their very nature, is uncertain and depends largely upon the service to which they are put.

Returned Goods.

By observing the following instructions carefully you will assist us greatly in giving you prompt and good service and in adjusting claims promptly.

Before shipping any material back to us, write us a letter stating briefly the nature of the complaint. In nine cases out of ten dissatisfaction is due to some slight misunderstanding which a short explanation from us will rectify. If the trouble is not one easily rectified by the purchaser or if the customer merely is not pleased or satisfied with the purchase, we will send a shipping tag and instructions for shipping the material which will insure proper credit being given.

Please do not return any goods without getting our instructions first.

Terms.

Our terms are either cash with order; or orders of \$5.00 or more will be sent by Express or Parcel Post C.O.D. upon receipt of one-quarter of the purchase price. We make no charge for boxing or packing but freight, express, or postage charges must be paid by the purchaser and on C.O.D. orders return charges on the money must also be paid by the customer.

Always remit by draft, express or postal money order, or by registered mail. It is not safe to send currency by ordinary mail and we cannot be responsible for money lost in this way.

We use extreme care in packing and we will guarantee the safe arrival in good condition of all material sent by Express. On material sent by insured Parcel Post we guarantee its delivery but cannot guarantee shipments against careless handling.

Shipments made by freight or by Parcel Post not insured are at purchaser's risk and we cannot guarantee their arrival or condition except that all material leaves our factory in good condition carefully packed for shipment.

Caution.

Be sure to write your name and address plainly on every communication you send us. Many forget even to sign their letters. We are anxious to serve you promptly.

In Conclusion.

If our goods and our service please you tell your friends—if not, tell us. These are the greatest favors you can extend to a business concern.

THE ELECTRICAL BOOK



The "Dim-a-Lite."

The Dim-a-Lite is a "vest pocket" rheostat, a portable attachment for dimming a single electric light. Remove a lamp from socket, screw it into the Dim-a-Lite, and screw the Dim-a-Lite into the socket. Pull the cord and get five changes of light: full, dim, low, night light and out. Fire proof, fool proof, unbreakable; will last a lifetime. Suitable for any lamp and any current, direct or alternating.

This attachment is indispensable in the nursery, the sick room, the bath room, the cellar or the hall way. Do not

grope in the dark; leave a dim light and save expense.

This device is adapted for use with 40 watt and 25 watt Mazda Lamps, and is not recommended for larger or smaller sizes.

Cat. No. W. M. 23. Dim-a-Lite with pull chain, 110 volts...... \$1.00

For use on 220 volts add ten cents extra.

Sewing Machine Motor.

There's no need to pay \$20.00 to \$30.00 for a sewing machine motor and an extra amount to an electrician to fit it to your machine. Buy this sewing machine motor, low in price and the first cost is the only cost. Fits any standard make machine, plain or drop head, cabinet size.

This is a positive aid, it reserves your strength, enables you to do quicker and better sewing. A slight pressure of the foot on the treadle is all you have to do. The automatic switch stops and starts the motor, operates the machine fast or slow as you desire. It can be instantly attached



REST WHILE YOU SEW.

to any standard make sewing machine, not like the obsolete style of motor that was fastened on with screws and clamps. Uses no more current than an ordinary lamp and operates on either direct or alternating current from any lamp socket. Buy one for yourself, your mother, sister, or friend, you will wonder how sewing could be so easy.

In ordering be sure to mention make of machine and whether drop head or stationary head.

Do it Electrically.

Power Motors.

These motors are of well known American manufacture, are intended for continuous service at their rated load, will stand heavy overloads for short periods of time and we can give no better endorsement than to say that we have used them for several years in our factory for small power purposes and in connection with motor driven apparatus which we have supplied.



Direct Current Motors.

Direct current motors are furnished Shunt wound, giving good speed regulation and high torque. These motors are open type without sliding base but base can be furnished at small additional cost if desired.

Cat.		Speed		Shipping	
No.	H.P.	R. P. M.	Volts	Weight	Price
99904	1/50	1100	110	22 lbs.	\$11.00
99905	1/50	1100	220	22	12.00
99384	1/30	1700	110	22 "	11.00
99385	1/30	1700	220	22 "	12.00
99908	1/20	1100	110	25 "	13.00
99909	1/20	1100	220	25 "	14.00
99388	1/15	1700	110	23 "	12.00
99389	1/15	1700	220	23 "	13.00
99410	1/10	1700	110	25 "	13.00
99411	1/10	1700	220	25 "	14.00
99390	1/8	1700	110	28 "	15.00
99391	1/8	1700	220	28 "	16.00
99394	1/6	1700	110	31 "	17.00
99395	1/6	1700	220	31 "	18.00
99396	1/4	1700	110	42 "	22.50
99397	1/4	1700	220	42 "	23,50
99392	1/3	1700	110	42 "	25.00
99393	1/3	1700	220	42 "	26.00
99862		1700	110	70 "	45.00
99863	1/2	1700	220	70 "	46.00

NOTE:—Price of & H. P. motors includes starting rheostat with low voltage release. Smaller sizes do not require rheostat.

See our Toy Motors for the Boys-Page 45.

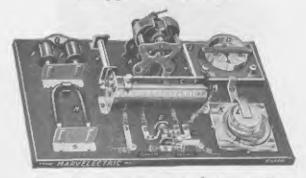
Induction Motors.



Induction motors operate on alternating current and are characterized by running at practically uniform speed regardless of load. They are extremely reliable on account of the absence of brushes, commutators, etc., and are to be recommended wherever alternating current is available and variable speed is not essential or can be secured by a change in pulleys.

Cal.		Speed		Price with	Shipping
No.	H.P.	R. P. M.	Volts	Pulley	Weight
98496	1/30	1800	110	\$12.00	20 lbs.
98497	1/30	1800	220	13,00	20
98498	1/15	1800	110	17.00	24 "
98499	1/15	1800	220	18.00	24 "
99878	1/10	1800	110	18.00	26
99879	1/10	1800	220	19.00	26 "
98500	1/8	1800	110	22.00	31 "
98501		1800	220	23.00	31 **
	1/8	1800	110	24,00	34 "
98502	1/6	1800	220	25.00	34 "
98503	1/6	1800	110	26.00	48 "
98504	1/4		220	27.00	48 "
98505	1/4	1800		40.00	75 "
99856	1/2	1800	110		75 "
99857	1/2	1800	220	41.00	13

Knapp Marvelectric.



No. 375. EXPERIMENTAL LABORATORY.

It holds attention with a vise-like grip that never weakens. The actual apparatus, the many drawings and directions, complete a wonderful combination,

See our List of Books on Motors,

capable of imparting more knowledge of things electrical than months of dry study. Think of the life-long pleasant memories that so simple an outfit will bring.

It takes up singly the subject of motors and dynamos, their windings and connections, the reversing of the direction of current, the effect of resistance on the speed and power; magnets, both permanent and electro, their lifting power and other uses, and the magnetic curves demonstrated by iron filings on glass; resistance and electrical measurements; the action of the solenoid; polarity tests, etc.

After a thorough understanding of the first principles so entertainingly acquired, combinations along original lines will suggest themselves to the experimenter as he advances.

The addition of one good dry cell 6 x 2½ inches, will enable the operator to begin business.

The outfit is mounted on a handsomely finished base 11 x 7 inches with holders for the different appliances to snap in. Material and finish the best.

The Outfit consists of:

- 1 Motor
- 1 Switch, reversing and starting
- 1 Resistance Coil, 15 ohms
- | Pair Electro Magnets
- | Permanent Magnet
- 1 Straight Rod for solenoid
- I Galvanometer with Compass
- 1 Glass
- 1 Box Iron Filings.

Cat. No. 375

\$3.75

(Shipping weight 31 lbs.)

Motors for Young Mechanics and Electricians.



TYPE A.

This motor has sufficient power to operate window displays, sign flashers, sewing machines, eight inch fan, buffing wheels, emery wheels, small lathes, etc.,

If you like to Make Things see our list of parts.

and develops is H. P. It runs on 110 to 130 volt lighting current, either direct or alternating, and comes equipped complete with double pulley, 2 inch grinding wheel, buffing wheel, polishing wax, oil can and cord and plug. Its speed is 3000 to 4000 R. P. M.

Cat. No. RA 116. Price complete \$7.50



TYPE B.

The type B motor is similar to the type A but is more powerful, furnishing horse power and having a three speed rheostat giving three variations of speed from 4000 to 6000 R. P. M. This motor comes equipped with a double pulley, grinding wheel, oil can, and cord and plug for operation on 110 to 130 volt lighting current, either direct or alternating. This motor is large enough for operating jewelers' and watch makers' lathes, for sharpening knives, grinding tools in the shop or garage, and a host of other purposes which require a small inexpensive motor.

Cat. No. R. B. 18. Price complete \$16.50



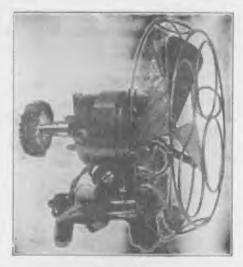
TYPE C.

This is a high speed polishing and grinding lathe running 4000 to 8000 R. P. M. with a three speed rheostat combined in the base. The motor is \frac{1}{8} horse power and is furnished with a two inch Norton grinding wheel, pulley, tapered spindle, 2\frac{1}{2} inch buff, oil can, wheel dresser, six foot cord and attachment plug. The shaft extends at both ends of the motor so that two operations may be carried on without changing over the wheels. Operates on 110 to 130 volt current, direct or alternating.

Cat. No. R. C. 018. Price complete \$18.00

Cat. No. R. F. 0180. Same as the type C outfit but equipped with a horse power motor. Price complete.... 21.00

You can easily think of a dozen ways you can use these Motors.



TYPE H.

A combination grinder buffer and fan, in horse power motor for use on 110 to 130 volts, direct or alternating house lighting circuit, and is the most complete outfit for the home, store and workshop. Furnished with tapered spindle, buff wheel, chuck, pulley, emery wheel, 8 inch fan and guard and 6 foot cord and plug. Cat. No. R. H. 016. Price complete \$12.00

Breezer Electric Fan.



8-INCH UNIVERSAL NON OSCILLATORY DESK BRACKET FAN.

The Breezer Electric Fan is especially adapted for use in small rooms, telephone booths, by the bedside, on the desk, and in enclosed motor boats and automobiles. Its appearance is most attractive, and is supplied in either nickel or oxidized copper finish.

A Toy Electric Train or Trolley-Page 49-will delight the boy.

The motor is highest grade throughout and is equipped with a speed regulating device. It is noiseless in operation, is adjustable to a wide variety of positions, and is fitted with rubber feet and will not mar the most highly polished surfaces.

Will operate on either direct or alternating lighting current and may also be

furnished for use on storage batteries.

Universal Electric Motor.



This motor is designed for running small mechanical and electrical devices requiring about 3/8 H. P. such as slot machines, music boxes, adding machines.

talking machines, and in fact all small power purposes.

The case is stamped steel finished in copper oxide with base attached. The armature coils are wound with silk covered wire by special machinery and impregnated with insulating varnish baked on. The field coils are wound with silk covered wire and covered with linen tape immersed in insulating varnish and baked.

Both commutator and brushes are well designed and are of liberal proportion. The brushes are so constructed that by simply turning a lever they will start the motor and by moving the lever you can increase or decrease the speed of the machine. This gives the motor variable speed without resistance coils or any outside form of controlling device. The tool steel shaft runs in polished phosphor bronze bearings which are lubricated by large self-feeding oil cups.

Weight 24 lbs.; shipping weight 34 lbs.

It's "Safety First" to send your order to Clapp-Eastham Co.

Attachments for Universal Motor.

Cat.	No.	250.	Arbor for motor	\$0.25
Cat.	No.	251.	Emery wheel, 3 inches	.40
Cat.	No.	252.	Scratch wheel, 3 inches	.70
Cat.	No.	253.	Buff wheel, 21 inches	.25
			Seven foot silk cord with socket plug	.75
	The	above	wheels cannot be attached to the motor without arbor.	

The Polar Cub Electric Fan.



Price \$4.95.

This fan solves the problem of the individual fan for office, home, store, hotel, steamship and hospital use. It operates on either direct or alternating current 105 to 115 volts, 30 to 60 cycles, at a cost of one cent for 6 hours. The fan can be moved through an arc of nearly 90 degrees; it can be turned on its base completely around so the breeze can be thrown in any direction desired. The bearings are noiseless and constructed of a special material, and never need oiling. The base has a perforated extension so that the fan can be hung on the wall. This fan is fully guaranteed, weighs 3 lbs., and is furnished complete with cord and plug in a substantial carton.

Just stop and think—a fan 8 inches high, 7 inches wide, and 4 inches deep, rich velvet black finish, nickel plated standard and blades, for \$4.95.

Important Notice.

All lamps listed by us are of the highest possible grade and are of American manufacture and should not be confused with cheap imported lamps offered elsewhere.

Owing to the extremely fragile nature of lamps and their liability to burn out if used on voltages other than those for which they were intended, we cannot assume any responsibility after they leave our hands and cannot replace any burnt out or broken bulbs.

Every lamp is carefully tested before shipment and if used on the proper voltage will give the greatest possible length of service.

Electric Flashlights.

In offering these superior quality flashlights, we wish to point out that they are all American made by a factory of twelve years' experience in making high grade material. Every flashlight is equipped with a genuine Tungsten lamp and a Tungsten battery, insuring absolute satisfaction to the purchaser and the longest possible use without renewal of battery or lamp. No one can furnish you with better bulbs, batteries, or cases at any price.

The batteries give an amount of electrical energy which, considering their size, is almost unbelievable. They give 400% more light and last many times longer than carbon flashlight batteries.

The Tungsten bulbs consume only about 3 the current that is taken by a carbon lamp.



Cat.	No.	6781.	Size 14 x 5 inches with vulcanized fibre case and so constructed that they cannot short circuit when in contact with metal. Small and convenient for use in the motor boat, automobile, garage, and wherever a small, compact source of intermittent light is desired. Price complete with Tungsten lamp and Tungsten battery.	\$0.90
Cat.	No.	791.	Price of renewal battery (Tungsten)	.30
Cat.		504.	Price of renewal bulb (Tungsten)	.17
Cat.	No.	6784.	Same as Cat. No. 6781 but larger, being 1½" x 6½". Price complete with Tungsten lamp and Tungsten	
			battery	1.10
Cat.	No.	790.	Price of renewal battery (Tungsten)	.30
Cat.	No.	504.	Price of renewal lamp (Tungsten)	.17
Cat.	No.	6786.	Same as No. 6784 but larger, being 14" x 84". Price	
			complete with Tungsten lamp and Tungsten battery	1.30
Cat.	No.	705.	Price of renewal battery (Tungsten)	.40
Cat.	No.	501.	Price of renewal lamp (Tungsten)	.17
	Do	n't run	your Auto or Motor Boat without a Flash Light	

Metal Cases.



These lamps are made with metal cases, leatherette covered in two sizes. They are inexpensive and will give exceptionally good service. Cat. No. 6798. Size 1\frac{1}{2}" x 6\frac{1}{2}". Price complete with Tungsten battery and Tungsten lamp \$0.85 Cat. No. 790. Price renewal battery (Tungsten)30 Price renewal bulb (Tungsten) Cat. No. 504. .17 Size 11" x 81". Price complete with Tungsten battery Cat. No. 6794. .90 and Tungsten lamp Cat. No. 705. Price renewal battery (Tungsten)40 Cat. No. 501. Price renewal lamp (Tungsten)17

Miners' Flashlights.



"FIBRE NON SHORT CIRCUIT."

A powerful light with reflector and lens for all portable work where a maximum of service and a brilliant illumination is desired.

mun	OT S	ervice an	d a brilliant lilumination is desired.	
Cat.	No.	6788.	Size 1½" x 6½". Complete with Tungsten bulb and	
			Tungsten battery	\$1.35
Cat.	No.	790.	Price renewal battery (Tungsten)	.30
Cat.	No.	504.	Price renewal lamp (Tungsten)	.17
Cat	No.	6789.	Size 1½" x 9". Complete with Tungsten lamp and	
			Tungsten battery	1.50
Cat	No.	705.	Price renewal battery (Tungsten)	.40
Cat.	No.	501.	Price renewal lamp (Tungsten)	.17
Cat.	No.	6790.	Size 14" x 13". Complete with Tungsten bulb and	
			Tungsten battery	2.50
Cat	No.	715.	Price renewal battery (Tungsten)	.70
Cat.	No.	544.	Price renewal lamp (Tungsten)	.15
,		See I	Pages 6 to 12 for high grade Power Motors.	

Pistol Flashlight.



Vest Pocket.

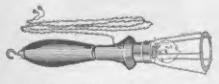


Nickel plated flashlights. Equipped with Tungsten bulb and Tungsten battery and with both flash and permanent contacts. Cat. No. 3420. Size 2½ x 1½ x to inches. Price Cat. No. 700. Price renewal battery (Tungsten)17 Cat. No. 545. Price renewal lamp (Tungsten)75 Cat. No. 3425. Size 21 x 13 x 4 inches. Price30 Cat. No. 1040. Cat. No. 545. Cat. No. 3429. .17 Size 2\frac{1}{3} x 2 x \frac{3}{4} inches. Price

Price renewal battery (Tungsten)

Price renewal lamp (Tungsten) .90 Cat. No. 1041. Cat. No. 546.

Trouble Lamp.



This inexpensive trouble light will be found a safe, clean, and useful lamp for use around the car, motor boat or garage.

Each lamp has a black wood handle with hook, wire guard to protect bulb, eight foot cord, and 6 volt, 4 candle power lamp.

Cat	No.	4891.	Price complete	\$0.85
		4892.	Same as above but fitted with Edison plug for attach-	
			ing in lamp socket. Price complete	.95
Cat	No.	G6.	Renewal bulb (Tungsten)	.24

Bicycle and Motorcycle Searchlight-Page 17.

Electric Ceiling Clock.

Did you ever awake in the night and want to know the time? Of course you have and you've tumbled out of a warm bed and fumbled with matches to find your watch. The Electric Ceiling Clock may be placed at your bedside with a long silk covered cord within easy reach and a slight pressure of the button will light up the transparent dial in such a way that a large facsimile is projected on the ceiling. The reflection is about two feet in diameter so that it may be easily read, even by one with poor eyesight. The value of this clock in the sick room is apparent. What would make a more acceptable gift for a parent, relative or invalid.

The reflecting attachment is easily removed and the clock can then be used as an ordinary illuminated dial clock at night and in the daytime as a boudoir or desk clock.

	A good tin	nekeeper, perfect in detail and beautifully finished.	
Cat.	No. 2235.	Complete	\$7.50
Cat.	No. 734	Renewal battery	.45
Cat.	No. 1190	Renewal Tungsten lamp, two required, each	.20

Electric Candelabra.

This is one of the tastiest and most decorative lamps as well as most useful and economical. They are equipped with an automatic switch so that grasping the handle to lift the lamp instantly produces a strong light. By setting it down the light is extinguished, giving the greatest possible life to each battery.



Cat.	No.	4851.	Size 8‡" high, base 4‡" diameter, shade 3‡" diameter, of colored, transparent cloth. Complete with battery.	\$2.00
Cat.	No.	542.	Renewal lamp (Tungsten)	.17
Cat.	No.	703.	Renewal battery (Tungsten)	.40

An electrically prepared breakfast is the best way to start the day—see pages 26 to 32.

Electric Bicycle and Motorcycle Headlight.



This headlight, while intended for motorcycle and bicycle use will also prove to be just the thing for your canoe or carriage and will throw a brilliant beam of white light.

It is made in two sizes, each substantially built for hard usage, and is fitted with a switch for shutting the light off.

	A th	ree-cell	battery is contained in the leather case with straps for faster	ing.
Cat.	No.	4817.	Size 34" diameter. Complete with battery \$:	3.75
				3,25
				.17
Cat.	No.	752.	Renewal battery (Tungsten)	.45

Electric Scarf Pins.



These pins operate from a small dry battery carried in the pocket and are an entertaining and attractive novelty that will surprise your friends when they see them light up mysteriously. We can supply a large variety of styles each complete with case, cord, and battery.

"As the twig is bent the bough will bend."
Electrical toys lead to wholesome serious study.

JEWELED.

Cat.	No.	5035.	Horseshoe Pearl encircled by Diamonds	\$1.05
			Colored Stone Cluster, Pearl Center	
Cat.	No.	5038.	Plain Pearl	1.05
Cat.	No.	5039.	Miniature Auto Lamp	1.05
Cat.	No.	5040.	Colored Stone Cluster, Diamond Center	1.05
			Colored Stone encircled by Diamonds	
			Pearl encircled by Diamonds	
			Metal Scull	



CARVED IVORY.

Cat. No. 5062.	Cat's Head	\$1.90
Cat. No. 5063.	Bulldog's Head	1.90
Cat. No. 5064.	Elk's Head	1.90
Cat. No. 5065.	Owl's Head	1.90
Cat. No. 5066.	Skull .,,	1.90
Cat. No. 5067.	Indian's Head	
Cat. No. 5068.	Bulldog	1.90
Cat. No. 5069.	Fox's Head	1.90
Cat. No. 5070.	Owl	1.90
Cat. No. 5071.	Skull and Crossbones	1.90

A phonograph brings many a happy winter's evening—See page 37.

Mazda Lamps for Automobile, Launch, and Small Lighting Purposes.

These lamps are the highest grade American manufacture with Tungsten filaments and will give a maximum of brilliant white light with the least current consumption (except the nitrogen type lamp) of any lamp on the market.

The actual current consumption is one watt per candle power approximately. The watts taken by any lamps are the product of its voltage multiplied by the number of amperes it consumes. The number and sizes of lamps that may be burned on a storage battery for a given length of time depends upon the watt hour capacity of the battery. Multiply the voltage of the battery by its ampere hour capacity and divide by the total watts of all lamps to be burned and the result will be the number of hours which the battery will light the lamps at one charge.

Multiply the volts and amperes generated by a dynamo and the result will show the total number of watts it will supply so that any number of lamps whose total consumption add up to the same number of watts may be lighted from this dynamo.

TYPE	CAT	ALOG NUMBI	ERS				
	Bayonet Socket Double Contact	Bayonet Socket Single Contact	Candelabra Screw Base	Candle Power	Volts	Amps.	Price
G 12	0131	0130	0132	9	6	1.5	\$0.27
G 12	0149	0151	0148	12	6	2.0	.27
G 161	0225	0224	0223	12	6	2.0	.27
G 12	0157	0139	0140	15	6	2.5	.27
G 161	0190	0189	0234	15	6	2.5	.27
G 161	0241	0242	0235	18	6	3.0	.27
G 161	0243	0246	0237	21	6	3.5	.30
G 161	0251	0250	0239	24	6	4.0	.30
G 8	057	051	956	4	6	.84	.21
G 8	067	061	066	6	6	1.25	.24
G 10	0107	0101	0106	6	6	1.25	.24
G 10	0115	0114	0116	8	6	1.70	.27
G 6	031	0481	032	2	6	.42	.21

See page 82 for complete Lighting Plant.

Type "C" Gas-Filled Automobile Headlight Lamps.

FORTY PER CENT MORE LIGHT for the same current consumption is obtained from the "C" lamp over any previous type of lamp produced. The "C" lamp brightens the road bed and gives more light immediately in front and on the side of the car, and less of a projecting beam than any other type of coil filament thus far developed. This beam, however, is amply sufficient for detecting objects at a distance, making automobiling at night a pleasure by using these daylight lamps.

No WIRING CHANGES are necessary and no additional equipment has to be procured in changing to the new MAZDA "C" type of lamp.

Description	Cata. No. Ediawan Base Double Contact	E-G (EC) 1		Volks	Amperes	Type and Size Bulb	Diameter, Inches	Maximum Over All Length Inches	List Price Clear	
Headlight (Focusing) Headlight (Focusing) Headlight (Focusing) Headlight (Focusing) Headlight (Focusing) Headlight (Focusing)	02100 02300 02302 02400 02304 02402	02101 02301 02303 02401 02305 02403	12 21 24 40 24 40	6-7 6-7 6-7 6-7 12-14 12-14	1.5 2.5 3.0 4.0 1.5 2.0	G- 8 G-12 G-12 G-16† G-12 G-16†	1 14 27 14 27 27	11 21 21 31 21 31	\$0.40 .35 .50 .75 .37	

The "Safety First" Lantern.



The Safety First Lamp is a scientific article, not merely a happy thought. It combines most light and longest life with least weight and bulk. The power of five candles, intensified by its lens, with any regular battery. May be used as a flasher or switched on steady for hours at a time. Built sturdy as a bullet. Throw it into the tool kit anywhere, any time, without danger of breakage.

> Why not make your own Moving Pictures with the Alamo Camera-Page 39.

Finished in deep rich blue and highly polished nickel plate. It is 3 inches in diameter, 10 inches high, and weighs 3 pounds including dry cell. It will give one hundred hours of light from any ordinary dry cell which you can buy anywhere, not a special battery.

No wicks to trim, no sooty globes, no oil, no smoke, no smell, no danger. Use it in the home, down cellar, up garret, in the sick room; take it into a clothes closet where a match might cause a fire, give it to the children and be safe. There's no fuel, no flame, no smoke, and your clothes are not soiled.

Mr. Farmer, take it into the hay mow, early or late,—anywhere; hang it by the bail under the buggy when you go to town. The strongest wind or rain cannot put it out.

Mr. Millwright, Mechanic, Importer or Watchman, you will find it useful a hundred times.

Mr. Sportsman, take it with you when you hunt, camp, fish or hike; use it as a headlight on your launch or around the engine without fear of explosion; no wet matches, no empty lantern.

Mr. Autoist,—for changing tires, reading signs or making repairs not only by the roadside but in the garage as well.

Mr. Photographer, use it in your dark room. A ruby lens is furnished at no extra cost.

Mr. Merchant, use it in your storeroom. It's safe and handy.

Cat. No. F. E. 480. "Safety First" Lamp. Complete with Tungsten lamp, battery, bail and handle. Price.... \$1.50

The Attacho Electric Lantern.



Makes every ordinary No. 6 Dry Battery a safe and handy lantern or flashlight for every

The "Attacho" will give an average of 50 hours' continuous light or eight to twelve months' intermittent service.

No springs, no wires, no switches, nothing to give trouble or to replace—always ready for use; can be used as a flashlight by pressing thumb on straddle bar as shown in picture. Will burn steadily if desired by unscrewing nut in center binding post of battery until it rests firmly against bottom of lamp.

FOR THE HOME it is indispensable for going in the cellar, closets, outbuildings, etc., and for the sick room.

FOR THE AUTOIST for changing tires and for general use around the car.

FOR THE FARMER for going into the hay mow, barn, and house without the danger of fire.

> Don't waste your time and patience with Matchesget a Flash Light.

The Viking Bell Ringing Transformer.

Discard your batteries, either wet or dry, and put an end once and for all to a needless source of expense and annoyance. These Bell Ringing Transformers are connected directly to your 110 volt, 60 cycle lighting circuit and will operate any number of bells, annunciators, etc., ever found in service. They are the last word in bell ringing transformers, are light in weight, and efficient in operation.

They can also be used to operate door openers, gas lighting systems, small lamps, toy motors, etc.

Built in three types as follows:

Type E. W. 6. Dimensions 31 x 31 x 2 inches. Shipping weight 21 lbs.

oltages obtained	When load i
6 volts	0 amps.
5 "	3 **
4 "	7 **
3 "	1.7 "
3 "	2.3 "
0 "	3 "

For use only on 110 volts, 60 cycles Alternating current. Cat. No. E. W. 6. Price \$1.50 Cat. No. A. 8. Dimensions 41 x 41 x 25 inches. Shipping weight 4 lbs., 14 oz.

	Freed meriding a smart in a	N. All A.
Voltages obtained		When load is
8 volts		0 amps.
6 "		2.5 "
4 "		3.5 "
3 "		4.
2		4.5 "
0 **		5 44

For use only on 110 volts, 60 cycles Alternating current. Price \$2.00

Cat. No. B. 3X22. Dimensions 43 x 44 x 28 inches. Shipping weight 5 lbs., 2 oz.

This type has three taps giving three different sets of currents, as follows:

TERMINA	LR 1 & 2	TERMINAL	LB 2 & 3	TERMINALS 1 & 3			
Voltagen When bland is		Voltages obtained	When load in	Voltages obtained	When load is		
8 volts 7 5 3 2	0 amps 1. " 2.8 " 4. " 4.4 " 5. "	14 volts 13 " 12 " 11 " 10 "	0 amps .2 .7 1 1.8 3.7	22 volts 20 :: 18 :: 16 :: 15 ::	0 amp		



Price \$3.00.

If everyone knew the convenience of a bell ringing transformer the battery makers would go out of business.

Electric Power Table.



A simple portable apparatus for the application of electric power for any household purpose where electricity is available. It is an ideal home power plant for the kitchen, workshop and laboratory with every modern labor and time saving appliance.

There are many appliances such as sewing machines, washing machines, ice cream freezers, etc., in every home which can be operated with increased ease and efficiency by electricity, and without the cost and inconvenience of a separate motor for each. The Power Table is not only a source of power for all other household devices, but is a veritable little workshop in itself.

The compact oak table occupying a space of only 18 x 26 inches, standing 30 inches high, can be moved as easily as a chair to any convenient point and is equipped with a 10 foot cord and connecting plug which fits any lamp socket. All gears are fully enclosed, eliminating all danger, and the current is turned on and off by a snap switch conveniently placed.

The ‡ H. P. motor is suspended on a hinged platform and entirely disappears when not in use, being covered by a sliding panel, leaving a smooth top of polished oak which can be used as an ordinary table.

Any of the attachments described on the following pages may be instantly attached to the motor by the movement of a small lever, and for transmitting power to other devices a detachable driving shaft and pulley is provided.

IN THE KITCHEN.

The Power Table will perform all the operations necessary in the preparation of food more quickly, better, and with absolute cleanliness as there are no nooks or crevices to collect dirt or dust, and it is not necessary to touch the food with the hands.

From freezing ice cream to chopping mincemeat it saves time, labor and waste. It will mix cakes, beat eggs, knead bread, grate horse radish, sharpen and scour knives, seed raisins, pit cherries or grind coffee all in a fraction of the time required by hand and without effort.

The Power Table is very easy to operate and does not require skill or experience, and all attachments except the tub of the ice cream freezer are heavily nickel plated and easily cleaned.

Don't let your wife be cross-lighten her duties electrically and let the sun shine.



Bread Mixer

Bread and Cake Mixers

These attachments will thoroughly mix dough in half the time required by hand without labor, dirt or fuss. Bread mixer has a capacity of two loaves, and both are extremely accessible for thorough cleaning.



Cake Mixer



Coffee Grinder

Holds two pounds coffee. The only perfect cup of coffee comes from freshly ground bernies.

Food Chopper

May be used for chopping meats, vegetables, mince meat, or any other food. Can be adjusted to cut fine or coarse as desired.



Ice Cream Freezer

This freezer has a capacity of two quarts and allows the preparation of pure, delicious ices and creams at home without the almost prohibitive labor of turning by hand.





Egg Beater

One of the most frequently used articles in the kitchen. Runs at just the right speed and is adjustable up and down.

Electrically operated household devices increase the joy of living.

Vegetable Slicer

Will slice to any desired thickness potatoes, cabbage, beets, carrots, and similiar vegetables, paper thin, if you want them so, or 1-4 inch thick.





Food Grater

For grating spices, etc.

Knife Sharpener

Will sharpen the dullest knife in a few seconds.

Knife Polisher

For polishing steel knives, that have become stained or rusted, in a few seconds.



Cat. No. F. S. 1000.	Power Table, weathered oak finish. Complete with detachable shaft and pulley, without attachments. Price	82.00
Cat. No. F. S. 999.	Power Table. Complete with detachable shaft and pulley, bread mixer, cake mixer, coffee grinder, meat chopper and ice cream freezer.	
		05.00
Cat. No. F. S. 1001.	Bread Mixer attachment only. Price	4.75
Cat. No. F. S. 1002.	Cake Mixer attachment only. Price	5.50
Cat. No. F. S. 1003.	Coffee Grinder attachment only. Price	3.00
Cat. No. F. S. 1004.	Meat Chopper attachment only, Price	3.75
Cat. No. F. S. 1005.	Ice Cream Freezer attachment only. Price	6.00
Cat. No. F. S. 1006.	Egg Beater attachment only. Price	2.90
Cat. No. F. S. 1007.	Vegetable Slicer attachment only. Price	5.00
Cat. No. F. S. 1008.	Food Grater attachment only. Price	4.00
Cat. No. F. S. 1010.	Knife Sharpener attachment only, Price	9.00
Cat. No. F. S. 1011.	Knife Polisher attachment only, Price	5.25

There's only one way to make perfect coffeein an Electric Percolator.

Universal Electric Home Needs.

How many of you know of the practical every day uses to which electricity may be put? How many of you realize that with the assistance of half a dozen small electric utensils the two lighter meals of the day may be prepared without so much as striking a match? How many appreciate the economy of operating the perfected devices now on the market? We believe these pages will open your eyes to the possibility of electricity in your home, and right here we want to speak a word of caution to save you keen disappointment and regret. We have carefully investigated the market,—in fact are using many of these household devices in our own homes,—and it is an unfortunate fact that many similar devices on the market built to sell a few cents or a dollar or two cheaper are a disappointment to the user, costing many times more in added current consumption and inefficiency than the slight saving in first cost and refusing to stand up staunchly to the work for which they were intended. A flat iron, for instance, may take more current, give less heat, and be so poorly designed as to be practically useless on account of cooling off immediately it comes in contact with any heavy work.

Our heating and cooking utensils are selected with extreme care from the best American manufactures, not with a view to cheapness or greatest profit to ourselves, but solely with a view to supplying our customers with result giving devices which will prove a source of permanent satisfaction and which may be operated at the smallest cost for current.

In selecting an appropriate gift for a relative or friend nothing will add more to his or her comfort or convenience than one of these electric appliances. Most of them will give pleasure to the entire family.

Coffee Percolators.

The Universal Electric Coffee Percolator is the best and most economical method of preparing delicious coffee. The ground coffee is placed in the cup at the top and the water in the pot below. When the current is turned on and heat is applied to the foot of the percolator a jet of water, lukewarm at first but quickly increasing in temperature, is forced up through the tube and percolates through the coffee down into the pot again. Owing to the special valve pump these percolators circulate six to ten times more water than is possible in any other percolator.

Guaranteed for five years when used on proper voltage.



NICKEL PLATED



NICKEL PLATED

Cat. No. E 9644.	4 cups F	rice \$	9.00	Cat. No. E 964.	4 cups	rice \$ 7	.50
Cut. No. E. 9646.	6 cups	19.6	10.00	Cat. No. E 966.	6 cups	. 8	3.25
Cat. No. E 9649.			11.00	Cat. No. E 969.	9 cups	9	00.0

For that chilly feeling use an Electric Radiator-Page 33.

Coffee Percolating Urns



Nic	W.B.L.	PLAT	ED

Cat.	No.	E	9144.	4	cups			п	2	.F	nice	\$11.00
Cat.	No.	E	9146.	6	cups	1	,	i			611	12.00
Cat.	No.	E	9149.	9	cups	,	r	7			1/16	13.00



N	ICKEL.	129 a.	PER
201	DATE OF PERSONS	a same	P. Sept. St.

Cat. No. 91404.	4 cupsPrice	\$17.00
Cat. No. 91604.	6 cups "	18.00
Cat. No. 91904.	9 cups	19.00



NICKEL PLATED

Cat. No	a. E/9166.	6 cupsPric	e \$15.00
	E'9169		16.00



Maron Drawns

		2417	Palita	P P PALLED		
Cas.	No.	9166044.	6	сира	Price	\$32.00
E and	NI.	0170044	-0	ACCUSE OF	qu.	22.00

Universal Electric Tea Pot with Tea Ball

Tea made in the Universal Tea Ball Tea Pot is always of just the desired strength, with the last cup the same as the first, because as soon as the beverage has steeped the proper length of time the tea ball is raised and the liquid remains the same strength.



NICKEL PLATED

Car.	No.	E'904.	4	cups.				i	. [rice	\$7.25
Cat.	No.	E 906.	6	CUDE.				Ī		44	8.00



NICKEL PLATE

Cat.	No.	E	9044.	4	cups	. Price	\$8.50
Cat	No	E	9046	6	CHES	44	9.50

Quit the dying habit-get a New Life Vibrator-Page 34.



Mission Pattern Samovar, Sugar Bowl, Cream Pitcher and 14 inch tray.

NICKEL PLATED

Universal Electric Hot Water Kettles

NICKEL PLATED



Electric Egg Cookers



NICKEL PLATED MISSION PATTERN

The Universal Egg Cooker, as its name implies, is not alone a utensil for boiling eggs on the table but can be used for the preparation of eggs in many other forms. It contains a removable rack in which as many as six eggs may be boiled at a time. In addition to this a food pan is provided in which it is possible to prepare anything that can be made in a chaffing dish equipped with a hot water pan, such as shirred, poached or scrambled eggs, Welsh rarebit, creamed chicken, lobster a la Newburg, etc.





Universal Electric Milk Warmers and Water Heater

Equipped with milk bottle, capacity 8 ounces, and extra cover for use when heating water.

Let a "Cyclone" dry milady's hair-See page 36.

Universal Electric Immersion Heater





Universal Electric Shaving Mug

Universal Electric Chafing Dishes





Universal Electric Grill

Complete with six foot flexible silk finish cord and indestructible plug. Heating Surface 72 x 4½ inches.

Depth, Frying pan 11 in. Boiling pan, 2 in. Griddle 1 in.

This appliance is probably adaptable to a wider range of uses than any other single electrical device obtainable. It will make perfect toast, cook eggs as you like them, grill bacon, chops, or a small steak. It will cook small portions of cereal, creamed chicken, beef or potatoes. For toasting crackers, preparing boiled frostings for cakes, making gravies, etc., nothing works better. In short you can prepare an entire meal at the table at a trifling cost.

Cat. No. E 981. Nickel Plated......



Price \$5.00

To shut off an electrical circuit anywhere at any time automatically use a time switch—Page 44.

Universal Electric Toaster



Crisp, golden brown toast can be made better by electricity than any other way. Universal Electric Toasters stand for the last word in convenience, uniform results, and economy of operation.

Cat. No. E 941. Nickel Plated.

Price \$4 00

Universal Electric Sad Irons



There are many cheaper flat irons on the market, but none better—we believe none so good. All the newest improvements are here represented, the principle of its invention being based upon scientific experiments. Owing to its construction the heat can radiate only through the bottom or ironing surface of the iron, preventing its natural tendency to rise.

Cat. No. E 903.	With stand complete	Pr	nce	\$3.00
Cat. No. E 901.	With stand complete		211	4.00

Universal Electric Curling Iron and Hair Drier complete with six foot flexible cord and wire stand.



The even temperature at which the Universal Electric Curling Irons are maintained has made these articles everywhere popular. When equipped with the Universal Hair Drier they are unexcelled for taking moisture out of the hair.

me same among men	The state of the s		
	Curling Iron, Diam. 5-16 in.		
	Same, with Hair Drier		
Cat. No. E 999.	Curling Iron, Diam. 7-16 in	5-1	3.50
Cat. No. E 9991	Same with Hair Drier	331	4.00

The Motion Picture Camera only a few pages over.

Electric Range, Oven and Hot Plates.

Cooking by electricity eliminates all the dirt, soot, bother and delay, discomfort, and danger, incident to flame cooking. The woman who cooks by electricity works in comfort. The room is neither overheated by a hot coal range nor full of unpleasant and unhealthy gas fumes. There are no dangerous open flames or matches. Cooking utensils stay clean and the heat is absolutely uniform and exact so that results may be accurately gauged.

The room is not overheated and these devices are particularly economical,

showing 25% greater efficiency than the ordinary electric stove.

These cooking devices are not toys but are practical cookers designed for heavy duty in the household and built for a lifetime of hard service.

The cost of current for cooking is surprisingly low. Most central stations make a special rate for cooking. In one city where 700 of these ranges are in use the average cost for current was \$2.50 per month.

Electric Range.



H. E. No. 30.

A handsome and durably built range which will give excellent satisfaction for the average family. Solidly constructed of blue steel, steel top, nickel plated edges, and legs. Three top burners each controlled by a three heat switch. The oven has two heating units, one at the top and one at the bottom and is equipped with a broiling attachment.

Oven dimensions 18 x 12 x 12 inches. The current consumption of all burners is the same, 880-440-220 watts, with the exception of right hand top burner which consumes 1100-550-275 watts.

NOTE:-This stove requires special wiring and cannot be run from a lamp socket.

Learn Telegraphy with an Omnigraph-Page 54.

Electric Oven.

The No. 9 Oven is designed for use on the ordinary lamp socket and consumes about the same amount of current as the ordinary electric flat iron. The oven is made on the fireless cooker principle and retains the heat long after the current has been turned off. The oven is large enough for two loaves of bread, two pies, two pans of biscuit, cakes, etc., and measures inside 10½ x 11 x 9 inches.



H. E. No. 9 OVEN.

(Shipping weight 35 lbs.)

Electric Hot Plates.

Compact, solid, and handsome in appearance, these hot plates are having a wonderful sale. They are ideal for light housekeeping and summer cooking and many find these hot plates used in connection with the electric



H. E. 10 HOT PLATES.

oven ample stove equipment for the average kitchen. Hotels, cafes, restaurants, drug stores, fountains, laboratories, physicians and dentists have also found these hot plates almost indispensable.

Fitted with long flexible cord and attachment plug. Three heats: high heat 660 watts, medium heat 330 watts, low heat 165 watts. Cooking surface 10½ x 10½ inches. Stands 5½ inches high.

Cat. No. H. E. 10. Hot Plate

(Shipping weight 17 lbs.)

Two burner with three heat control, constructed the same as the H. E. No. 10 Hot Plate but with two burners, each taking somewhat more current with corresponding increase in heat. Stands 6½ inches high; current consumption, high heat 880 watts, medium heat 440 watts, low heat 220 watts, each burner.



H. E. No. 15 HOT PLATE.

Cooking surface 10 x 21 inches.

Meters for battery and auto use-Page 43.

Electric Radiator.



H. E. ELECTRIC RADIATOR No. 110.

To take the chill from a bed room, living room, bathroom, or nursery in spring and fall or to quickly warm a room otherwise heated, nothing will be more convenient or comfortable than an electric radiator. More efficient than an open fireplace with its coal or wood, dust, ashes, smoke, and danger. The heat can be regulated, and unlike the open fire, where less heat is used, less current is paid for, and the expense stops the moment the heat is turned off. These radiators can be moved about from room to room and are invaluable as auxiliary or emergency heaters. They can be used at night for a few moments to comfortably heat a sick room or in the morning to heat a room exposed to cold winds.

This radiator may be attached to a lamp socket and is furnished with a seven foot cord and plug.

Body is polished blue steel, base nickel plated.

If interested in electric ranges, which are absolutely practical, send for our special catalog "H. E."

NOTE:—Send for special catalog of cooking devices if you wish to give yourself or a friend the delight of clean, wholesome, delicious cooking with all of the drudgery removed. It's as practical as it is pleasing.

The New Life Vibrator.

Will relieve pain and give strength and vigor to the entire body,

Everyone knows that almost any kind of pain can be relieved by rubbing the affected part. A person suffering with headache instinctively passes his hand back and forth across his brow. Pain in the muscles or joints is relieved in the same way—by rubbing. When in addition to gently stroking the affected part we apply pressure with the fingers or knuckles, kneading the flesh as a baker kneads bread, this is called "massage." Tapping with the finger tips, or slapping with the open hand, is known as "percussion," but no matter what form of stimulation is employed—rubbing, massage or percussion—the object of the treatment is the same, namely, to alleviate pain by causing the blood to flow more freely at the affected part.

Any congestion, which means any interference with the free circulation of the blood, is sure to result in pain or discomfort and may eventually lead to serious consequences unless promptly relieved. Nature is the best of all physicians and those remedies are safest and surest which stimulate the natural functions of the body when, from any cause, they become sluggish.

Electric vibratory massage has long been recognized as the most efficient remedy for any ailment arising from congestion, or imperfect circulation. The blood is not only the great upbuilder of the body but is the great purifier as well, carrying the waste matter and poisonous substances (or toxins) to the lungs, liver and kidneys where they are destroyed or are ejected from the body. If the free circulation of the blood is obstructed at any point these toxins, or poisonous substances, instead of being carried off, gradually accumulate at the point where the obstruction occurs, just as a small stream will deposit sediment at any point where the free flow of the water is obstructed. Vibratory massage, applied to the affected part, quickly breaks up these obstructions in the blood channels and by stimulating at the same time the flow of blood causes the disease-breeding toxins to be rapidly washed away.

The subject of Vibratory Massage and the proper use of the New-Life Vibrator are fully treated in a handsome 300 page cloth bound volume which is given free to every purchaser of a New-Life Vibrator.

If you suffer from headache, neuralgia, indigestion, constipation, rheumatism, lame back, stiff or sore joints or muscles, if you are afflicted with facial blemishes (wrinkles, pimples, scaly skin or sallow complexion), if your scalp is full of dandruff and your hair lacks life and lustre—buy the New-Life Vibrator.

A Toy Motor will delight a boy's heart-Page 45.



Type A

This type of New-Life Vibrator is designed especially for home use. It is a beautiful little instrument, very compact and strong, and will give good service to every member of the family. Each Type A outfit consists of one vibrator (with cord and attachment plug for connecting it to the electric light fixture) and six applicators, all packed in a handsome carrying case of black leatherette lined with red satin. A speed regulating switch enables the motor to be run fast or slow.

Cat. No. H. B. 100. New-Life Vibrator, Type A. Price \$11,25

Type C

This is the professional type of vibrator used by physicians, nurses and masseurs. It is of heavier construction and has a more powerful motor than the vibrator designed for home use. The deep, penetrating vibrations produced by the Type C instrument make it particularly suitable for cases requiring energetic treatment and this style of vibrator is widely used in hospitals, sanitariums and Turkish baths. The vibrator and six applicators come packed in a handsome black leatherette carrying case, satin lined.

Cat. No. H. B. 101. New-Life Vibrator, Type C. Price \$15.00



Type B.

The Type B is similar to the Type A but is intended for use in homes where there is no electric current available for operating the vibrator. The deep box contains fifteen dry battery cells, providing current sufficient to operate the vibrator for many months. When the original cells are exhausted new ones can be obtained cheaply from any dealer in electrical supplies. Six applicators are furnished with the Type B outfit and the cord attached to vibrator has a special plug for connecting it to the battery terminals.

Cat. No. H. B. 102. New Life Vibrator, Type B, with batteries. . . \$21.75 Cat. No. H. B. 103. New Life Vibrator, Type B, without batteries. 17.25

Be sure to look over our list of Books.

Cyclone Hair Dryer.



Light, powerful, durable, trouble proof.

The "Cyclone" is an absolutely perfect hair dryer, giving either a hot or cold blast instantly.

The vital points of construction are the heating unit, the motor, the fan, and the switch. The heating unit is distinctly different from any other; indestructible and efficient. The result is an instantaneous hot blast when you want it.

The motor is powerful; the moment you turn the switch there is life, heat, power, blast,—all without noise.

The switch is a three point contact type of ample capacity. One turn gives a strong hot blast; two turns, a strong cold blast.

The "Cyclone" has a substantial appearance and is mounted in a handsome highly polished aluminum casing. It operates on both alternating and direct lighting current, may be attached to any lamp socket and is simple to operate, as all parts are protected. It is impossible for hair to become entangled in the mechanism.

The perfect hair dryer at a reasonable price.

Cat. No. H. B. 104. Cyclone Hair Dryer with case Price \$13.00 Cat. No. H. B. 105. Cyclone Hair Dryer without case " 12.00

An Electric Fan will make your summer a cool one.

The Arionola.



A new and wonderful principle of phonographic reproduction. Quality of music equal to the best. A price lower than lowest.

For years some of the world's greatest minds have been striving to improve the methods of reproducing musical tones and the human voice. No marked advance was shown, however, until recently when the wooden sound board principle so well known in the piano and other musical instruments was applied to the Arionola.

The Arionola will give you the highest quality of tone and music, truthfully rendering the world's greatest artists and performers with an unequalled clearness of enunciation and purity at a price which is almost nothing compared to the pleasure and instruction it affords.

By referring to the cut you will understand the new principle employed in this machine. The Arionola is designed like the human throat. This eliminates the necessity of the megaphone principle employed in all others.

The sound waves are carried from the reproducer R through the tone arm A to the very small horn which is seen pointed inward in the recess in front of the cabinet. The sound waves are then thrown against a wooden sounding board located at the end of this recess which is designed on scientific principles and causes the sound to be reflected outwardly and to increase in volume. All metallic and

muffled tones of other makes are eliminated by this principle. This method eliminates the necessity of having a large and expensive cabinet and makes possible the low price at which this machine is sold.

The Arionola is so constructed that it will play Victor, Columbia and Edison records, and in fact any disc record made, including the wonderful ten cent records now so popular. The usual needle is employed for side cut records (Victor, Columbia, Little Wonder, etc.) and a jewel point for vertical cut (Edison) records, the only change being to turn the reproducer over as shown in cut to position A for vertical cut and position R for side cut records.

The Arionola is handsomely finished in dark mahogany with all metal parts highly nickel plated. The double spring motor is noiseless and plays two twelveinch records at one winding.

As the Arionola weighs only ten pounds it may be readily carried to the summer home or on all sorts of outings.

OUR SPECIAL PROPOSITION.

We absolutely guarantee the Arionola will please you and will send this machine upon receipt of purchase price for three days' trial. If you are not delighted at the end of this time and do not consider you have received the greatest value obtainable in a phonograph, return the machine to us at our expense in as good condition as you received it and we will cheerfully refund your remittance, the only cost to you for the three days' enjoyment being transportation charges in one direction.

Before purchasing a phonograph, no matter what price you intend to pay, you will be glad if you first hear the Arionola.

Cat.	No.	A.	777.	Arionola complete for playing all styles of disc records including the jewel point (necessary for playing Edison Diamond Disc records,—the most wonderful in the world)	\$15.00
Cat.	No.	A.	778.	Arionola for playing Victor and Columbia and all side cut records (including 10 cent records) but without jewel point for Edison records Price	12.50
Cat.	No.	A.	779.	Carrying case designed especially for this machine with a section for carrying records, attractively finished with dark grain leather cloth, all corners, hinges, etc., nickel plated Price	3,00
Cat.	No.	A.	780.	Album to hold 12 ten-inch records Price	.75
Cat.	No.	A.	781.	Album to hold 12 twelve-inch records Price	1.00
Cat.	No.	A.	782.	Jewel Point needle, necessary for playing Edison Diamond Disc records	3.00

An Electric Toaster makes toast the way you like itcrisp and brown,

MOTION PICTURE CAMERA

Make your own Movies
with the
Alamo Motion Picture Camera

\$35.00

No larger than a Kodak.

Uses 50 ft. rolls standard Perforated Motion Picture Film.

Aluminum Body. Grain Leather Covering.



\$35.00

Daylight loading Film Magazines.

Rapid F 6 Aplanat Lens.

Full view finder.

Detachable crank.

Film Meter.

Size 21 x 41 x 81.

Weight 41 lbs.

The Most Perfect, Practical Motion Picture Camera at a Price Within Your Reach'
A beautifully finished instrument capable of producing the highest
grade motion picture negatives.

Motion Pictures at Home.

open up an entirely new and fascinating field. They afford an opportunity to keep an accurate record of the experiences within your family circle that you will look back upon with pride and delight.

Previous experience in photography is not essential to the successful use of this camera not only in the home but in making studies of bird, animal and insect life, all the wonders of nature such as clouds, waterfalls, etc., strange scenes in foreign lands, floods, fires and industrial and agricultural methods and processes such as machinery in motion, mining, dredging and a thousand and one forms of activity.

The film capacity is fifty feet at one loading, sufficient for the class of work for which it is intended. Any number of loaded magazines may be carried and used in taking successive subjects and the resulting negatives may be joined for

printing in a continuous positive film for projection, up to standard reel capacity (1000 feet).

Although simplified, the camera is not lacking in any essential detail for the production of the highest class of motion picture work.

For the benefit of the beginner it may be said that the usual 1000 foot reel tells a complete story and is usually composed with an average of 20 feet of film to the scene. Fifty feet of film would take all that the producers of current events films, such as Pathe Weekly, Hearst-Selig Weekly, Animated, etc., would purchase of news pictures, such as railroad wrecks, cyclone wreckage, flood scenes, fires, celebrities, etc.

The 50 foot film offers the following advantages:

First—Economy in the use of film; the general tendency is to use too much. Second—Development of 50 foot lengths is easily accomplished.

Third—Weight and Bulk. With the Alamo Camera and a supply of loaded magazines the entire weight may be within five pounds.

Fourth—The lens regularly furnished with the Alamo is ideal for all work in good light and does not require focusing. After gaining experience the user may purchase the special Zeiss Tessar F 3.5 lens, which is the same as used on the highest priced professional cameras.

Specifications and Prices.

Aluminum body, covered with black grain leather. Film movement, toothed sprocket, drum propulsion with claw movement at film trap. Take-up actuated by flexible metallic belt. Daylight loading film magazines interchangeable. Full view finder, frame slides within camera when not in use. Film meter. Lens, Fixed Focus, F 6 aplanat lens of great depth and full covering capacity used at full aperture: objects eight feet to infinity are sharply focused. May be stopped to F 11 or F 16 to sharpen on subjects at closer range. Shutter, Four blade multispeed movement, ball bearing and noiseless.

Cat. No. S. P. 740. Alamo Camera as described Price \$35.00

Special Lens Equipment.

We will furnish the Alamo Camera complete with Zeiss Tessar F 3.5 50 m m lens in focusing mount at \$58.00.

Projection.

For exhibiting positive films printed from the negatives made in the camera, we offer the Baby Simplex Projector, the simplest, least expensive and most efficient apparatus ever devised for amateur use. Any number of Alamo Camera pictures up to twenty may be joined in any desired sequence for the printing of a standard 1000 foot reel of positive film for the projector, or shorter length positives may be used. All standard films from any picture producer or exchange may be shown through the Baby Simplex. It is built with the same high grade materials used in professional projectors selling at \$300.00 and over. The projector consists of lamp house, set of condensing lenses in focusing jacket, on pedestal base, in combination with a head of simple and efficient design containing the film moving mechanism. The source of light is a powerful "Baby Arc" operating on the ordinary incandescent house lighting circuit, either direct or alternating current, or, if preferred, a lamp house designed for incandescent lamp will be furnished. A rheostat and cord and plug are furnished.



When used with the arc light, the projector will give brilliant screen pictures 3 x 4 feet at a distance of 12 feet, 4 x 5 feet at 15 feet, and 5 x 7 feet at 20 feet, and larger pictures at a greater distance with but slight decrease in brilliancy.

Cat. No. S. P. 741. Baby Simplex Projector including either arc light or socket for incandescent bulb (bulb not furnished), lenses, head, film retorts, two 500-foot reels and hard wood base board. Price complete \$65.00

Cat. No. S. P. 742. Simplex Developing Outfit, capacity 50 feet.

Price 15.00

If preferred, we can have your work developed for you in a splendidly equipped laboratory at a cost of 1c per foot. We can also furnish positives, including stock, at 5c per foot.

NOTE:—If interested in "out of the ordinary" cameras with extraordinary speed and other unusual features send for our special camera catalog.

Direct Current Battery Meters.

Following our invariable custom, we have carefully avoided the cheapest and poorest quality, believing that a meter which will not indicate permanently and accurately is worse than none.

These meters have been manufactured for the past ten years, are of permanent magnet construction, and such refinements have been incorporated as will meet the most exacting demands.

"The Ultimate" Pocket Instrument.



These meters provide an inexpensive and convenient method of testing dry batteries, storage batteries, low voltage lighting systems, and not only indicate volts and amperes but also show the polarity and avoid the necessity of carrying a separate polarity indicator. They are furnished with black letters on a white dial. Cat. No. H. 020. Ammeter 1½" face, reading 0-40 amperes. Price \$1.00 Cat. No. H. 021. Voltammeter 1½" face, reading 0-10 volts, 0-30

Cat. No. H. 0022. Voltmeter 14" face, reading 0-10 volts....Price 1.20

Miniature Switchboard Instruments. D'ARSONVAL TYPE.

Specially forged Tungsten steel magnets of ample cross sectional area are used and the moving system which is the lightest construction consistent with severe service is mounted in high grade jewel bearings. The cases are stamped from one piece of brass in special dies and are extremely rigid and substantial. The quality of these instruments may be summed up as a maximum of reliability and durability.

The finish is in highly polished nickel, and connections are made to back studs. They are arranged for front of board mounting and have zero adjuster for setting the needle to zero should necessity arise.

Diameter of case $2\frac{1}{4}$ inches; diameter over all $2\frac{\pi}{4}$ inches. Depth $1\frac{\pi}{4}$ inches. Approximate weight 12 oz.

Voltmeters.

						Price
Cat.	No.	H.	2257.	0-10	volts	\$6.00
Cat.	No.	H.	2269.	0-30	volts	7.00
Cas	Ma	H	2263	0.50	volte	7.50



Replace your worn out storage battery at small expense our line is complete.

Ammeters.

Cat.	No.	H.	2212.	10-0-10	amperes	Price	\$6.00
Cat.	No.	H.	2214.	15-0-15	amperes		6.00
Cal.	No.	H.	2216.	30-0-30	amperes	49	6.50

Combined Voltammeter.



This instrument consists of a volt meter and ammeter mounted side by side. with stud terminals on the back. The advantage of this construction over two separate meters lies in economy of space and lower cost. Dimensions 4th" x 24".

Cat.	No.	H.	22573.	0-10 volts,	10-0-10	amperes	Price	\$9.00
Cat.	No.	H.	22575.	0-10 volts.	15-0-15	amperes		9.00
Cat.	No.	H.	22579.	0-10 volts,	30-0-30	amperes	46	9.00
Cat.	No.	H.	22613.	0-30 volts,	10-0-10	amperes		10.00
Cat.	No.	H.	22617.	0-30 volts,	20-0-20	amperes		10.00
Cat.	No.	H.	22619.	0-30 volts.	30-0-30	amperes	44	10.00

The Midget Meter

Indicate in either direction of current, 2 5-16 inches diam, intended principally for battery testing.

Cat. No. E440. Ammeter 0-30 amperes Price \$3.00 Cat. No. E441, Voltmeter 0-10 volts







Range-0-3 amperes, and 0-5 amperes, open scale. Finish-Nickel, Black insulated base.

Connection-Front connected.

Diameter of Base-3 inches,

Diameter of Front-2 3-8 Inches. Depth-1 1-4 inches. Accurately calibrated. Will stand 100% overload.

Cat. No. E442. Model "H" Hot Wire Ammeter 0-3 amperes, Price \$3.75 Cat. No. E443. Model "H" Hot Wire Ammeter 0-5 amperes, Price 4,00

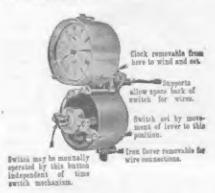
A complete lighting plant for camp, auto or boat-See page 82.



Time Switches.

These Time Switches while primarily intended to turn off lights of electric signs automatically will open or close any electrical circuit at the time for which the clock is set.

TYPE A (One Day, Wind and Set Each Day).



Cat	No.	C.	106.	10	ampere	double	pole		\$7.00
								44	8.00
									9.00
	Turn	n lie	hts eith	er o	n or off	but not	both	at one winding.	
	Two	T	pe A S	Swite	hes con	nected is	n seri	es will turn lights both on ar	d off.

TYPE C (Eight Day).



Tun	is cl	urrent o	n and off each day one week with one winding.	
		109.	The second secon	e \$30.00
			60 ampere double pole	
			100 ampere double pole	
			200 ampere double pole	

TOY MOTORS.

Little Hustler Motor,

WITH NEW STARTING SWITCH.



This little motor will run on one dry cell, is 3½ inches high, finished in black enamel with nickel plated trimmings and the binding posts and switch are mounted on the field to avoid disturbing connections when using the motor without the base. The ½ inch shaft is fitted with a pulley for running mechanical toys, etc. Shipping weight I lb.

Cat.	No.	100.	Motor only	\$0.80
Cat.	No.	101.	Fan 4½", nickel plated	.20
Cat.	No.	100a.	Complete parts for motor with directions for assembling	
			(no starting switch)	.70

Type BB motor is larger and stronger than the Little Hustler. Has 6 pole armature I inches diameter, laminated. Pulley I diameter, inch groove, starting switch, height 4½ inches. This motor will drive a 6-inch fan at high speed and will operate models, toys, etc. It is finished in black enamel with nickel trimmings. For intermittent work one or two ordinary dry cells are sufficient, while for more constant service, 4 cells connected two in series and two in multiple will more than double the life of the batteries. The motor will also run on a 2 volt storage battery.

Cat.	No. 10	BB Motor, 2 to 4 volts, shipping weight 24 lbs Price	\$1.55
Cat.	No. 10.	Fan, four 6-inch blades, shipping weight ½ lb "	.40
Cat.	No. 10	3. Fan Guard, shipping weight & lb "	.40

O. K. Motor.

The O. K. Motor is a very close copy in miniature of the highly efficient commercial machines of to-day. This motor is most attractive in design, has a three-pole laminated armature 1½ inches in diameter and is finished in black enamel with nickel plated trimmings. The motor will run well on one or two dry cells or on a two or four volt storage battery.

Practical gifts are appreciated by young or oldtrinkets are soon forgotten.



Motor

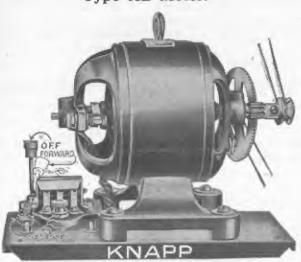
Leader Motor.

"Bigness" fairly radiates from this little motor even in the illustration. This detailed reproduction of a modern power plant will give a boy more helpful fun than he can get in any other way. Parents will appreciate its assistance to their boys in the study of electricity, the fascinating subject of the hour. The motor will drive from either pulley. The reducing gear is easily thrown in and out of mesh with the pinion on the shaft and transforms the high speed of the shaft to greater force at slower speed. The reversing switch is positive in action and operates either as a starting switch or to reverse the direction of rotation. The finish is black enamel with nickel trimmings, armature laminated, 3 poles 11 inches diameter.



See our list of books on How to Make Things.

Type XL Motor.



Larger and more powerful than the Leader. Specifications: Field—two pole, 6 slots, laminated 1\frac{3}{2} inches diameter, reducing gear, reversing switch. Height 4\frac{3}{4} inches. Shipping weight 3\frac{1}{2} lbs.

Type A1 Motor.



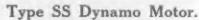
This motor is ideal for operating on a six volt storage battery and will be found useful for operating toys, window displays, fans, and a large number of

Read about our Arionola, the perfect phonograph.

small power purposes. This motor has a cast field with form wound coils, a drum type armature, 1½ inches diameter, 6 slots laminated, ¼ inch shaft, gauze brushes, oil cups, wick feed and mica insulated commutator. Pulley ¾ inches diameter, finish black enamel, 4¾ inches high including base and ring. Shipping weight 4 lbs.

Cat. No. 192. Same as No. 191 with metal base and reversing switch.

Price 3.35





This dynamo will give you a source of electricity at will. It gives the boy or student also an insight of the method of converting mechanical energy to electrical energy, will demonstrate the great fundamental laws of mechanics in a delightful way which excites the interest and spurs him on in his endeavors.

With this source of current at hand you can electroplate, charge storage batteries, run lamps, motors, trains of cars, induction coils, and in fact the number of experiments is only limited by the knowledge and desire to make them.

As a dynamo, this motor may be driven by a gas engine, water motor, sewing machine, or any other power that will furnish the desired speed. It may also be run as a motor direct from storage batteries or dry batteries.

If desired to run through a toy transformer on 110 volts A. C. the field connections should be changed to series as per diagram furnished. It runs well on 4 to 6 volts.

As a dynamo it will give 4 amperes at 6 volts or 24 watts. This will light about 24 candle power in Tungsten lamps. Shipping weight 6 lbs.

Get one of our Multivolt Transformers and run your electrical toys from the house lighting circuit.

Electric Trains, Trolley Cars and Racing Automobiles.

Electricity as applied to these toys is safe, clean to handle, and in addition to instilling into the boys' minds the fundamental principles of mechanics and electricity provides endless pleasure and many hours of clean, wholesome fun.

The average boy will soon discard the train operated by a spring which must be wound up as too crude and out of date, but the electrically propelled train or car is one he will never tire of.

The construction of these toys is the best throughout, the bodies are pressed steel coated with best quality enamel, and the motors are durable and long lived. The enamel can be washed and all lettering and striping is in gold.

The illustrations give but a faint impression of the beautiful appearance of these cars or the attention to minute details.

Passenger cars have vestibuled platforms, four swinging doors on hinges, and glass windows.

Electric headlights are mounted on the platforms of all cars.

While these cars are a source of amusement and instruction at all seasons of the year, they will particularly please in the long winter evenings, and as a holiday or birthday gift for a younger brother, son or relative you could scarcely think of anything which would give more genuine delight.

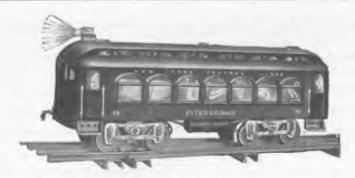


OUTFIT No. 100.

Consists of No. 100 vestibuled car and 8 sections of curved track, making a circle of 3½ feet in diameter. The car is 11 inches long, 4 inches wide and stands 6 inches above the rails. An electric headlight is mounted on the platform. Outfit will operate on 4 or 5 dry batteries, or on the house lighting circuit by using a Multivolt Transformer, described on page 53.

Price, substantially packed with full directions for operating \$6.00

Send for our special Wireless Catalog.

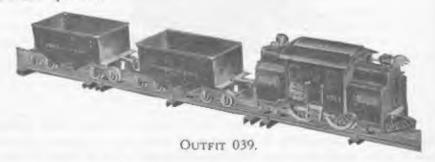


OUTFIT L. T. 010.

This type of car is being brought into use by many railroads. The reproduction is so elaborately done as to have the appearance of a pullman coach. A headlight is mounted on the roof, the doors are hinged, and stained glass shows through the transoms. The finish is dark green enamel, and the motor is mounted on the forward truck. The car is 16½ inches long, 4 inches wide, and stands 6 inches above the rails. The truck is fitted with a controller which enables the car to be stopped, started, or reversed automatically by using the No. 62 trips described later. Outfit will operate on 4 to 6 dry batteries or on the house lighting circuit by using a multivolt transformer described on page 53. The outfit includes 8 curved and 4 straight sections of track, making a circle $3\frac{1}{2}$ feet in diameter or an oval $3\frac{1}{2}$ feet by 5 feet, 9 inches.

OUTFITS L. T. 038-039-041.

The locomotive is 12 inches long, 3½ inches wide and 5 inches above the rails. It has four driving wheels 2½ inches in diameter. It will haul any number of trailers up to 12.



The truck is fitted with a controller which enables the car to be stopped, started, or reversed automatically by using the No. 62 trips described later. All of these outfits will operate on 4 or 5 dry batteries or on the house lighting circuit by using a multivolt transformer described on page 53.

See pages 8-9-10-11 for small motors for the workshop or garage.



OUTFIT 041.

	Each lo	com	otive is	equipped with an electric headlight.	
Cat.	No. L.	T.	038.	Locomotive only with 8 sections of curved track, making a circle 3½ feet in diameter. Substantially packed, with full directions for operating. Price	\$8.50
Cat.	No. L.	T.	039.	Consisting of locomotive, two ballast cars, and 8 sections of curved track, making a circle 3½ feet in diameter. Length of entire train 31 inches. Price, substantially packed, with full directions for operating	10.00
Cat.	No. L.	T.	041.	Consisting of locomotive, gondola car, cattle car, box car, ballast car, and caboose, making a train 5 feet, 3½ inches in length. This outfit includes 8 curved and 4 straight sections of track, making a circle 3½ feet in diameter or an oval 3½ feet by 5 feet, 9 inches. Price, substantially packed, with full directions for operating.	14.50



OUTFIT No. 051.

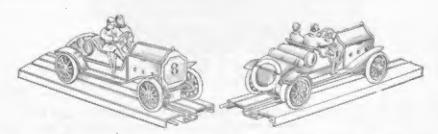
This locomotive is constructed of sheet steel and has a coal bunk, tender 7 inches in length and is 11 inches long, stands $5\frac{1}{2}$ inches above the rails. It has counterbalanced driving wheels and an electric headlight. It operates on five or six dry batteries or on the house lighting circuit in connection with the multivolt transformer described on page 53. Outfit includes 8 curved and 4 straight sections of track, making a circle 31 feet in diameter or an oval 31 feet by 5 feet 9 inches.

Cat. No. 051. Price, substantially packed, with full directions for operating \$11.50

Our Flash Lights are the best.

OUTFITS L. T. 080-081-084.

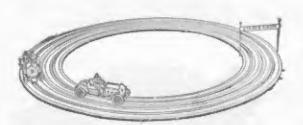
These automobiles are 8½ inches long and are perfect reproductions of racing cars with miniature oil and gasoline tanks, radiators, wheels, gears, levers and real rubber tires, etc. To add to the realism, the cars are controlled by a driver and mechanician, both perfectly designed.



Cat No. L. T. 080. Consists of 8 sections of O curved track (making a circle 36 inches in diameter) and one automobile with driver and starting post. Price complete \$7.50

Cat. No. L. T. 081. Consists of 8 sections of 1 curved track (making circle 30 inches in diameter) and one automobile with driver and starting post. Price complete 7.5





CAT. No. L. T. 062. AUTOMATIC TRIP.

By the use of these Trips all of the foregoing trains and cars, except Nos. 081, 082 and 084, can be reversed automatically. They are placed at any point where it is desired to have the car reverse and their action is positive. Their action is most fascinating and mysterious.

"Fun with Electricity" is a great outfit for a boy-See our book department.

Low Voltage Transformers.

"THE MULTIVOLT."



These transformers are a year ahead of them all, they are safe, efficient, and economical, and perfectly constructed. They are guaranteed unconditionally and the types equipped with a regulating rheostat give a range of fifteen voltages while fifteen additional voltages can be obtained from the permanent posts, all of which are mounted in an easily accessible position on top of the apparatus.

CONSTRUCTION.

The cores are made of the highest grade electrical silicon transformer sheets properly laminated. The primary and secondary coils are made of the correct size and amount of enameled wire with insulation between the layers.

The whole is embedded in an improved insulating compound which renders the transformer proof against heat, air, oil, or water. The transformers are enclosed in a steel case handsomely finished in black enamel, having a brass nameplate showing the various voltages obtainable. All other metal parts are nickel plated and polished.

They are furnished for use on alternating current only, 100 to 130 volts, 60 to 133 cycles, and 100 to 130 volts, 25 to 40 cycles.

"Multivolt" transformers, while primarily intended for operating electrical toys, can be used for operating various other electrical apparatus requiring low voltages within their range such as induction coils, annunciators, and bells, for the medical practitioner, burglar alarms, wireless apparatus and a thousand and one other uses. There is a tremendous advantage in using the "Multivolt" transformer in place of batteries (either dry or storage) wherever it is possible to do so. Batteries deteriorate with use and age and must be renewed, while the transformer lasts forever. Batteries of any sort do not give a constant current while the current from the transformer is unfailing and constant.

We guarantee you prompt and courteous service.

PRICES AND SPECIFICATIONS.

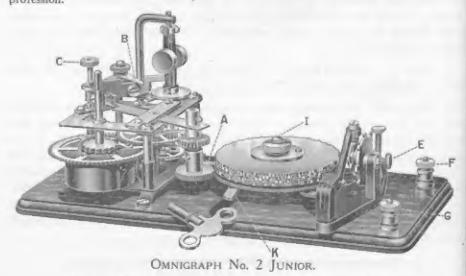
Туре	No. of Voltages	Range	Watts	Size	Price \$4.00	
Cat. No. S50	15 permanent 15 with use of rheostat	I to 15 in I volt steps with	50	4½ x 3½ x 3 in.		
	30	rheostat				
Cat. No. T75	15 permanent 15 with use of rheostat	14 to 24 in 14 volt	75	5½ x 4½ x 3½	\$5.50	
	30	steps with rheostat				
Cat. No. K 150	15 permanent 15 with use of rheostat	2 to 30 in 2 volt steps with rheostat	150	61 x 5 x 31 in.	\$7.50	
Cat. No. Q50	3 permanent	4 to 12 in 4 volt steps	50	4½ x 3½ x 3 in.	\$3.50	
Cat. No. L75	6 permanent	3∮ to 21 in 3∮ volt steps	75	5½ x 4½ x 3½ in.	\$5.00	

Omnigraphs.

A TELEGRAPH (WIRE OR WIRELESS) SELF-TEACHER.

There is no instrument similar to the Omnigraph for teaching telegraphy. It is patented and used very extensively, including the U. S. Bureau of Navigation, to test all applicants for licenses. It will teach you both commercial and wireless telegraphy, Morse and Continental codes. Purchase an Omnigraph. It brings an expert operator into your home. Start the Omnigraph, it will send you messages by the hour. You may get tired but the Omnigraph will not. The cost is small, the results quick and sure.

Learn to receive both wire and wireless messages either for pleasure or as a profession.



See our line of Telegraph Instruments on another page,

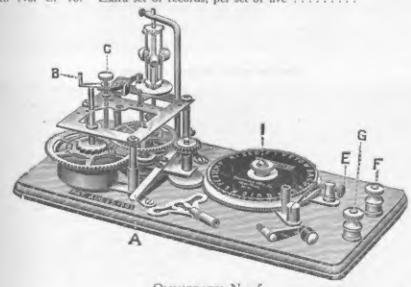
This type measures 11 x 6 x 5 inches and will work with any key and sounder or with any buzzer for imitating wireless stations. The sending is absolutely perfect at every speed from 10 to 100 words per minute. You can change the message in the fraction of a second, even while the machine is running. You can send the whole message continuously or repeat a fifth part repeatedly.

The Omnigraph No. 2 Jr. is provided with five movable message changers. Each dial is divided into five equal parts, making the dials equal to 25 dials. By rearranging the dials in different positions you send yourself thousands of new messages. All parts of this Omnigraph are made of metal and will last indefinitely. The instrument is always ready to send and will run 45 minutes at one winding.

The ability to read messages, Wireless or Morse, is 90% of the art as sending is comparatively easy. The Omnigraph No. 2 Jr. will teach you quicker, better, and surer than any other way. It will give you unlimited practice. The Omnigraph is guaranteed in every way, and is sold with the privilege of examination. If not exactly as represented, your money back for the asking. Shipping weight 7 lbs.

Omnigraph No. 2 Jr. with spring motor and one set Cat. No. C. 39.

Extra set of records, per set of five " Cat. No. C. 40. .50

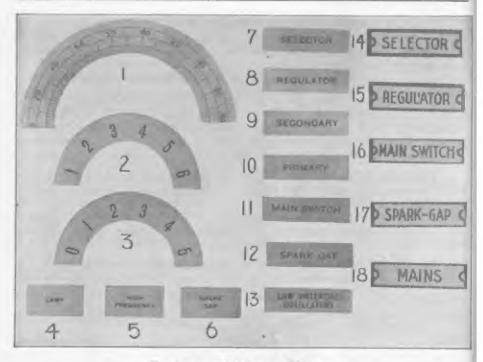


OMNIGRAPH No. 5.

Guaranteed to work perfectly with any instrument or buzzer on any line. Measures 10½ x 5½ x 6 inches, weight 3½ lbs. The instrument is complete, including transmitter arranged for either spring motor or hand operation, spring motor with governor for varying the speed and book of instruction.

Cat. No. C. 42. Extra record dials, each

Our special Wireless Catalog is the acknowledged leader.



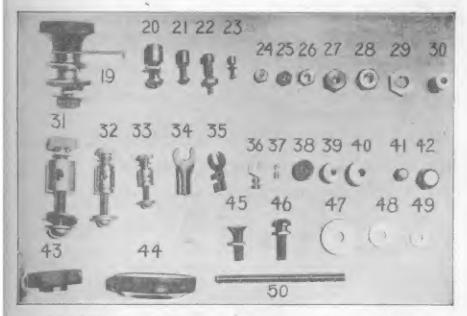
Scales and Name Plates.

Celluloid name plates printed in black ink on finest grade heavy white celluloid. Only titles listed can be supplied at present.

Cat. No.	1.	Celluloid Protractor	scale	, 180	degrees.	90	divisions	of	two	degrees	each,
		outside diameter, 4	3/8	inches	inside	dia	meter, 2	15	/16	inches.	width.

	3/4 inch,
	Price each\$0.25 Price per doz 2.00
Cat. No. 2.	Celluloid scale, 6 divisions numbered 1 to 6, 3 inches outside diameter; 1 7/8 inches inside diameter, 9/16 inches thick.
	Price each
Cat. No. 3.	Celluloid scale, 6 divisions, 0 to 5, same dimensions as Cat. No. 2,
	Price each
Cat. No. 4.	Celluloid name plate, I 3/16 inches long, 5/8 inches high "Lamp". Price each
Cat. No. 5,	Same as No. 4. "High Frequency",
	Price each
Cat. No. 6.	Same as No. 4. "Spark Gap", Price each
Cat. No. 7.	Price per doz
	Price each
Cal. No. 8.	Same as No. 7. "Regulator",
	Price each

Cat. No. 9.	Same as No. 7.	"Secondary",		
			Price each	.05
D . Kt. 10	C 1/ 7	men a	Price per doz.	,40
Cat. No. 10.	Same as No. 7.	Frimary ,	Dr. 1	
			Price each	.05
Cat No. 11	Same as No. 7.	White Could be	Price per doz.	.40
Semi- 1 100 111	Danie da 140, 7.	main partien '		.05
				.40
Cat. No. 12.	Same as No. 7.	"Spark Gap"	rice per doz.	1781.7
		opara sap ;	Price each	.05
				.40
Cat. No. 13.	Same as No. 7.	"Low Potential	Oscillatory'.	. 10
				.05
				.40
	A1	uminum N	ame Plates.	
FV 1.7				
Bright a	luminum name p	plates printed in	black, 1 1 inches long, 1 inch high.	
Cat. No. 14.	"Selector",			
			Price each\$0.0)5
			Price per doz	40
Cat. No. 15.	"Regulator".			
				05
C . N. 16	011 - 0 - 10		Price per doz,	40
Lat. No. 10.	"Main Switch",		D. C. C.	40
				05
C-1 N- 17	"Spark Gap",		Price per doz	10
-en 140 17.	opark Cap ,		Price each	10
Cat. No. 18.	"Maine".		Price per doz	P.C.
1-01 (0)	TANKETTINE 4		Price each	15
			Price per doz	
			a seem from some anneauthorizate all	The same



The Universal Motor—Page 11—drives a rotary spark gap like sixty.

Cat.	No.	19.	Three blade instrument switch, edgew 1 1/4 inches diameter, 3/4 inch high end of switch blade, 1 3/8 inches.	ise contact type, hard rubber handle, n, distance from center of handle to	
			end of switch blade, 1 3/0 inches,	Price each \$0.0 Price per half dozen 3.3 Price per dozen 7.3	75
Cal.	No.	19A.	. Similar to No. 19 but smaller and tact, composition handle, 11/16 inch	Price each	20 90 50
Cat.	No.	20.	Nickel plated switch point 7/16 in brass screw,	Price each 1-49	06 05} 05
Cat.	No.	21.	Nickel plated switch points, 5/16 i brass screw.	Price each I to 49	05 04 04
Cas.	No.	22.	Plain brass switch point, 1/4 inch knurled shank 5/16 inch, threaded inch, overall length, I inch with nut,	diameter on face, 3/16 inch high, shank 5/16 inch, plain shank 3/16 Price each 1 to 49	05 04} 04
Cat.	No.	23.	Nickel plated switch point, 3/16 inch plated iron screw,	diameter, 3/16 inch high with nickel Price each 1 to 49	04 031 03
Cat.	No.	30.	Nickel plated brass cylinders, ends sinch high, 7/16 inch diameter.	Price each I to 49	05 04 04
Cal.	No.	30A	. Same as No. 30 but plain hole is clear 8-32 threaded rod,	Price each 1 to 49	05 04 04
Cat.	No.	31.	Heavy brass binding post for use up	to 60 amperes, Price each	20
Cat.	No.	32,	Nickel plated standard Clapp-Eastha head or wire or cord tip in hole.	Very convenient, Price each	.12
Cat.	No.	33.	Same as No. 32 but smaller.		.08
Cat.	No.	. 34.	Heavy copper lug for currents up to	30 amperes, Price each Price per dozen	.03 .30 .20
	W	e lis	st a fine line of books on ho	w to make things electrical.	

CLAPP-EASTHAM COMPANY CAMBRIDGE, MASS.

Ca	t. No. 3	5. Copper lug for currents up to 15 am	Price each Price per dozen Price per 100	.25
Cat	. No. 30). Small spade tip for wire No. 16 B	& S or smaller, Price per dozen Price per 100	.12
Cat	. No. 37	. Small cord tip for fine wires,	Price per dozen	.10
Cat	. No. 21	 Rubber composition covered binds thread. 	pg post, 11/16 inch diameter, 10-32 Price each	.15
Cal	No. 38	. Knurled nut, nickel plated, threaded		.05
Cat.	No. 39.	Knurled nut, nickel plated, threaded	8-32, Price each 1 to 99 Price each lots of 100	.07
Cat.	No. 40.	Knurled nut, nickel plated, threaded		.07
Cat.	No. 41.	Nickel plated acorn nut, threaded 8		.04
Cat.	No. 42.	Nickel plated acorn nut, threaded 10	Price each lots 1 to 99	.043
Cat.	No. 43,	Hard rubber handle, knurled edge, I part, 3/8 inch, total height, 1/2 inch,	Price each	.25 2.40
Cat.	No. 44.	Hard rubber handle, knurled edge, 2 part, 3/8 inch, total height, 1/2 inch,	inches diameter, height of knurled	.40
Cat	No. 210). Composition handle, 1 1/4 inches di	Price per dozen ameter, 13/16 inch high, Price each	.20
Cat	No. 211	. Same as No. 210, 2 1/4 inches diam		.35
Cal.	No. 212	Knurled knob, 15/64 inch diameter,	13/32 inch high, 6/32 thread, Price each	.04
Cat	No. 213	. Knurled knob, 11/16 inch diameter,	15/32 inch high, 10/32 thread, Price each	.05







No. 212

No. 213

Cat. Nos. 45 and 46. FLAT AND ROUND HEAD BRASS MACHINE SCREWS.

	4 5 6	6	3 3 3	2	3	0 2 6	3	14 10 12		20 24	1	18 20 24	1	16 18 20
No.	- 2	2	-	6	1	8	1	0		12		14	1	6
In.	Price													
1-8 3-16 1-4	Per Daz, .03 .03 .03	Per Gress .26 .26 .26	Per Doz. .04 .04 .04	Per Gross 37 .37 .37	Per Doc. .06 .06 .06	Per Grow .56 .56 .56	Per Deal. .08 .08	Per Gress .80	Per Dez.	Per Gross	Per Dor.	Per Gross	Per Doz.	Per
5-16 3-8 7-16 1-2 9-16 5-8 11-16	.04 .04 .04 .04 .04 .04 .04	.27 .29 .31 .32 .34 .37 .39	.05 .05 .05 .05 .06 .06	.39 .42 .44 .46 .50 .53	.07 .06 .06 .06	.60 .64 .68 .72 .76 .80	.09 .09 .10 .11 .12	.84 .88 .92 1.00 1.08 1.16	.12 .13 .13 .14 .15	1.08 1.16 1.24 1.32 1.40 1.48	.15 .16 .18 .18 .19	1.42 1.48 1.60 1.72 1.84 1.96	.25 .26 .27 .28 .29	2.32 2.44 2.56 2.68 2.80
3.4 13-16	.05	.42	.07	.59 .62	.10	.88	.14	1.22	.18	1.64	.23	2.20	.32	3.0
7.8 15-16 1.8 1.4 3.8 1.2 5.8 3.4 7.8 1.4 1.2 3.4	.05	.47	.07 .08 .08 .09 .10 .12 .13 .14 .16 .18 .19 .23	.65 .69 .72 .84 .96 1.20 1.36 1.52 1.68 1.84 2.16	.10 .11 .12 .13 .15 .16 .19 .21 .23 .26	.96 1.04 1.16 1.28 1.40 1.52 1.68 1.84 2.00 2.16 2.48	.16 .17 .19 .20 .21 .22 .24 .26 .27 .29 .32 .39 .30 .63 .75 .92 .1.29	1.48 1.64 1.76 1.88 2.00 2.12 2.28 2.44 2.60 2.76 3.08 3.72 4.80 6.00 7.20 9.20 11.60 9.12 9.13 9.13 9.13 9.13 9.13 9.13 9.13 9.13	.19 21 .22 .24 .26 .27 .29 .31 .33 .36 .40 .48 .58 .71 .88 .10 .125 .150	1.80 1,96 2.12 2.28 2.44 2.60 2.80 3.00 3.20 3.40 4.64 5.60 6.80 8.40 10.00 12.00 14.40	.26 .28 .30 .31 .33 .35 .37 .39 .41 .43 .47 .57 .67 .79 .95 .1.25 1.25 1.83	2.44 2.68 2.84 3.00 3.16 3.32 3.52 3.52 4.12 4.52 5.44 6.40 9.20 12.00 14.80 17.60	37 39 41 43 .46 .49 .52 .55 .58 .67 .75 .83 .91 1.25 1.50 1.67 2.08	3.28 3.52 3.72 3.92 4.16 4.40 4.96 5.28 5.60 6.40 7.20 8.80 12.00 14.40 16.00 20.00

Tin Foil.

Heavy tin foil cut into sheets 6 1/2 inches by 8 1/2	
Cut in sheets 5 1/2 inches by 8 1/2 inches, running	Price per lb\$0.20
Cut in sneets 3 1/2 inches by 6 1/2 mones, running	Price per lb

Threaded Brass Rod.

Thread	Per inch	Per foot
Cat. No. 50. 6-32	\$.02	\$.12
Cat. No. 50A. 8-32	.02	,18
Cat. No. 50B. 10-32	,03	.20
Cat. No. 50C. 14-20	.04	.24
Cat. No. 50D 5/16.18	.04	.26

Let us be your Machine Shop.

Hexagon Brass Nuts.

	Thread	Per Doz.	Per 100
Cat. No. 24.	6-32	\$.10	\$.40
Cat. No. 25.	8-32	.10	.45
Cat. No. 26.	10-32	.12	.50
Cat. No. 27.	14-20	.16	1.00
Cat. No. 28.	5/16-18	.20	
			1.10
Cat. No. 47.	Copper washers,	7/8 inch diameter, 1/4 inch hole, 1/16 inch thic	k.
		Price each	
		Price per 100	
Cat. No. 48.	Copper washers.	5/8 inch diameter, 3/16 inch hole, 1/16 inch thic	le le
	and the same of the		
		Price each	
W 71 10		Price per 100	
Cat. No. 49.	Copper washers,	1/2 inch diameter, 1/8 inch hole, 1/32 inch thic	k,
		Price each	
		Price per 100	30
		a sice her too streets	restrict LOW



Cat. No. 51. Wire test clamps, can be used for fastening two wires without soldering or for taking taps from any circuit (Supplied only with wing nut in place of hex. nut shown),

		it sources						
Price	for	2 wires.	each		9 0	2 0		.15
Price	per	dozen						1.50
Price	for	3 wires,	each	ia	£ =		 7 1	.20
Price	per	dozen					 2.1	2.00

Phosphor Bronze Sheet.

For springs, etc. In sheets 6 inches wide, cut to any desired length.

Thickness B & S Gauge	Per inch	Per foot
18	\$.07	\$.70
20 26 28	.06	.54
26	.04	
28	.03	30 27 22
30 36	.03	.22
36	.02	,14

Sheet Brass.

Supplied only in sheets 14 inches wide, cut to any desired length,

The state of the s	and one of many deposit	som somelette
Thickness 1/16	Price per inch	Price per foot
	\$.20	\$1.75
1/8	.40	3.50
3/16	.60	5.25
1/4	.80	7.00
No. 24 B & S	.06	7.00 .53
No. 22 B & S	.07	.70
No. 20 B & S	.09	.70 .87
No. 18 B & S	.10	1.00
No. 16 B & S	.12	1.32

Brass Rod.

Inches	SQUAR	E	ROUND		HEXAGO	ON
Diameter	Price per in.		Price per in:	Per ft.	Price per in.	Per.ft.
1/16	\$0.01	\$0.034	\$0.01	\$0.03	\$0.01	\$0.031
1/8	.01	.07	.01	.05	.01	.07
3/16	.01	.08	.01	.06	.01	.08
1/4	.014	.14	410.	.10	.01 2	.14
5/16	.021	.18	,02	.14	.021	.18
3/8	.021	.24	.021	.20	.021	.24
1/2	.04	.38	.03	.28	.04	.38
5/8	.06	.53	.05	.45	.06	.53
3/4	.08	.77	.06	.65	.08	.77_
7/8	.10	1.06	.08	,90	.10	1.06
1	.13	1.40	.12	1.16	.13	1.40
1-1/8	.18	1.70	.14	1.46	.18	1.70
1-1/4	.22	2.15	.16	1.80	.22	2,15

18% German Silver Wire.

	PRICE PER POUND.	
Size B & S	Bare	Double Cotton covered
8	\$0.66	
10	.68	
12	.69 .69	
14		04
16	.69	98
18	73	1.05
20 26	86	1.54
34	1,43	2.70

Pure Silver Rod for Electrical Contacts.

Inches diam. 5/16 3/8 1/2 3/4	Per inch \$1.00 1.50 2.75 5.75	Cut into contacts 17/64" long drilled and tapped 1/8" deep, 10-32 thread Each \$0.50 .75 1.00
3/4	2.73	11,250

Wire Solder.

Antenna Wire.

Cat. No. 53.	Stranded Bronze antenna wire, 7-strands, No. 20 B & S, very strong and recommended for long spans,
Cat. No. 54.	Per ft,, .014; per 1000 ft,, 11,50 Stranded copper antenna wire, 7-strands No. 22, tinned to prevent cor- rosion.
Cat. No. 55.	Per ft01; per 500 ft 4.00 Aluminum antenna wire No. 14, about 250 feet to the pound, Price per lb
	o not recommend aluminum wire on account of the difficulty of making good

Silicon Steel for Transformer Cores.

Thickness, .017 inch, averages 60 pieces to 1 inc	h thickness, weight, about 1/4 lb. per cu. in. Price per lb
Cut in any size pieces a	50c per 100 pieces extra

Tubes for Winding Tesla Coils.

Cardboard cylinders 13 inche	s long. 8 inches diameter.	Each \$0.25
Cardboard cylinders 8 inche	s long, 6 inches diameter,	.20
	s long, 8 inches diameter, wound for Tesla coil secondary, s long, 6 inches diameter, wound for Tesla coil,	1.05

Edgewise Wound Copper Strip for Tesla Coil Primaries.

Thickness of copper strip	Width	Inside diameter of turns	Price per turn
1/16"	5/16"	5"	\$0.10
1/16"	1/2"	73"	.15
1/16"	1/2"	103"	.25

Copper Ribbon.

Thickness	Width	Price per foot
.005"	1/8"	\$0.001
,005"	1/2"	.01
.016"	la.	.05
.016"	I 1/2"	.074

Our hot wire meters—page 43—take the fuzz out of your spark.

Antenna Insulators.



This is an entirely new design of porcelain strain insulator, and the character of material used, and its unique shape, give it features particularly desirable in an insulator for guy wires and antenna wires. These insulators are made of high tension porcelain, having high mechanical strength and a very long leakage path. You will note that the insulator is under compression when in use, greatly increasing its effective strength, and also should the insulator ever break, the aerial structure which it supports will not fall as the wires are crossed and will still support it.

We recommend the use of the No. 8984 insulator with sets of $\frac{1}{4}$ K. W. standard spark type, and up to $\frac{1}{2}$ K. W. for quenched spark sets and for all receiving sets.

For ½ K. W. standard spark sets and 1 K. W. quenched spark sets, we recommend two of these insulators connected in series, and for 1 K. W. standard spark

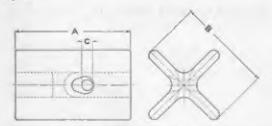
sets and 2 K. W. quenched spark sets, three connected in series.

The larger insulators should be used for very large antennae, and for their guy wires where great mechanical strength is required although the No., 8984 has an ultimate strength in excess of 20,000 lbs.

These insulators are also practically non-absorbent, and have a very low

electrostatic capacity.

From a cost standpoint they not only reduce the cost below any other insulator on the market, but at the same time provide better insulation and greater mechanical strength at a lower price.



C	DIMEN	SIONS IN I	NCHES	WEIGHT	PRICE	PRICE EACH	
CATALOG NO.	A	B C		EACH	PER 100	LESS THAN 100	
8984 11629 11630	31 5 6+	34 48 58	ON AN ON	1 t lbs. 2 lbs. 3 t lbs.	\$15.00 40.00 50.00	\$0.20 .45 .55	

Connect a good set of instruments to your antenna selected from our special wireless catalog

Antenna Insulators.



These insulators are moulded in the conventional form from a special composition, and many thousands are in use for insulating guy wires, antennae, etc. Cat. No. M 01. Composition ball insulator, diameter of insulator, 21

Cat. No. M 02. Composition insulator, length of insulator, 4 inches,

Cat. No. M 03. Composition insulator, length of insulator, 61 inches,

Leading-In Bushings.



These bushings are glazed white porcelain and may be used for bringing lead in wires into a building for wireless telegraph apparatus or any other high tension service.

	Dime	nsions	in in	ches		Test Valture	Price each
A	B	C	D	E	F	ottage	A LINE MEGII
8	3	5	31	12	4	30.000	\$2,40
8	3	5	5	11	54		2.85
10	4	6	34	13	4		3,00
10	4	6	5	13	54		3.75
14	6	8	33	14	4		4.15
18	8	10	31	11	4		5.40
22	10	12	41	13	5		6.60
26	12	14	5	1.2	58	100,000	8.25
	18	A B 8 3 10 4 10 4 14 6 18 8 22 10	A B C 8 3 5 10 4 6 114 6 8 18 8 10 22 10 12	A B C D 8 3 5 3 8 8 3 5 5 10 4 6 3 8 10 4 6 8 3 8 18 8 10 3 8 22 10 12 4 8	8 3 5 3 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1	A B C D E F 8 3 5 3½ 1½ 4 8 3 5 5 1½ 5½ 10 4 6 3½ 1½ 4 10 4 6 5 1½ 5½ 14 6 8 3½ 1½ 4 18 8 10 3½ 1½ 4 22 10 12 4½ 1½ 5	A B C D E F 8 3 5 3½ 1½ 4 30,000 8 3 5 5 1½ 5½ 30,000 10 4 6 3½ 1½ 4 40,000 11 4 6 8 3½ 1½ 4 50,000 12 14 6 8 3½ 1½ 4 55,000 18 8 10 3½ 1¼ 4 70,000 22 10 12 4½ 1½ 5 85,000

Porcelain Tubes and Cleats.

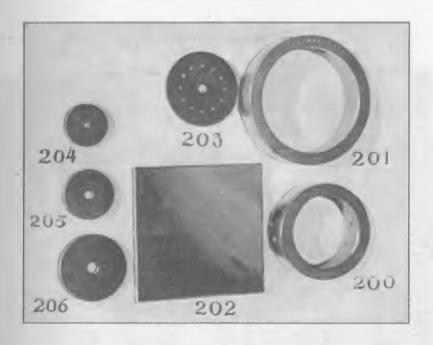
Cat. No. 63.

Glazed Porcelain cleats, two wire, intended primarily for house wiring, may also be used for a wide variety of purposes such as insulating aerial wires by stringing the wires through the holes, etc.

Glazed porcelain knobs, make very good insulators for bottom of apparatus when used as feet and for a wide variety of other purposes in addition to their intended purpose for house wiring.

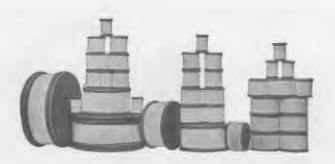
Our books on wireless are by the best Authors.

Cat. No. 65.	Pope	ELAIN TUBES		
Inside diameter	Outside diameter	Length	Price each	Price per doz.
Inches	Inches	Inches	40.02	40.20
5/16 5/16	9/16 9/16	6	\$0.03	\$0.30 .40
5/16	9/16	12	.12	1.20
5/16	9/16	24	.35	4.00
1/2	13/16	3	,04 ,05	.40 .50
1/2	13/16 13/16	6 12	.05	1.40
1/2	13/16	24	.45	5.00
Plates Fined	Berns 6 - 24		East Plate OFFIL	
A	B sagning A Dr. St. Ho	745		14-6-328
竹人	PA	Fine Some		43-40 H
11 mes + 12)			(B)	2/
(O	Sand I The			1 O
11 1	Stuck.	Wages W	est is	1 8.
1 Same #	016 AL 10-02 A STOCK H R	\$-32 Addit		, /
016.78	Galler	A STATE	. 1111111111111111111111111111111111111	
	10-32 Iran	O. T.		
18 ray 27 -	15r09	TOWN K FOR	4-30 M	See Name
Condenser	Case.		-0 mg- 0	
	- 3 fd 1 1 m	B. C. Bring of	In lead Alle	4 -1-1A-
-				
	STack 1	- I far	112 12	
	OUS AI	-18 rad - S-	-41	Blitzen
200	1 -9	Stock HR	10-1 B	otary Variable
1		1/2-	-1//	Condenser
	347	\$ 1 °	Marie Ma	chanical Defail
	10	(- d	B	Fig. 1
1		1	/"	1.19.1
	Rotary Variab	le Conden	ser Parts.	
				Price each
	nary or Rotary Pla	ates. Part A	and B	\$0.02
Shaft, & Drill F	Rod. Part C	*********		10
Hard Rubber B	earing Support. P.	art D		10
Hard Rubber B	earing Support. P	art E		
	End Plate. Part			03
Bearing Screw.	Part G			
Snatt Dearing D	ushing. Part H			02
Lock Nut. Par	t J			02
	art L			2 -
Stationary Plate	Separator. Part I	VI		
	parator. Part N .			
Rotary Plate Se	parator. Part O .			
Brass Screws for	Assembling Station	nary Plates		04
	se, Nickel-plated.			
	p with engraved Sc			1.00
	andle and pointer .			



Parts.

N	0.	200.	Hard Rubber Inductance Rings, polished, 21 inches inside diameter, 3 inches outside diameter, 1 inch wide, without	
N	0.	200a.	Same, machined with two winding grooves, holes for 12 taps	\$0.65
			and bearing holes	1.15
N	0.	201.	Hard Rubber Inductance Rings, 31 inches inside diameter,	*
		201	4 inches outside diameter, I inch wide, without machining.	.90
N	0.	201a.	Same, machined with two winding grooves, holes for 30 taps	1.70
8.7	1.	202.	and bearing holes	1.40
7.4	(U)	202.	polished all over	.65
N	lo.	202a.		.03
			20-25	1.05
N	o.	203.	Hard Rubber Disc, polished all over, 21 inches diameter,	
		202	inch thick	.15
-		203a.	Same, drilled with 12 holes for switch points	.30
-		204.	Hard Rubber Handles, 14 inches diameter, knurled	.15
		205.	Hard Rubber Handles, 11 inches diameter, knurled	.20
		206. 207.	Hard Rubber Handles, 2 inches diameter, knurled Polished Mahogany Base, 6 inches long, 4½ inches wide,	.25
			å inch thick	.60



Fine Copper Magnet Wire

Size B & S	Single (Cotton	Double	Cotros	Single	5ak	Double	e Silk	Enan	isel
	Ft. per lb.	Price	Fi. per lb.	Price						
12	50	\$ 37	48	\$.39					50	\$.38
14	84	.37	77	.41	1				79	.40
16	125	.38	125	.42	127	\$.60	131	\$.77	126	.42
18	200	.39	200	.44	205	.62	210	.79	200	.43
20	311	.46	298	.48	319	.66	312	.84	319	,44
22	491	.49	461	.54	504	.69	493	.89	507	.46
24	778	.54	745	.63	795	.77	779	1.04	803	.51
26	1188	.60	1118	.70	1240	.90	1202	1.24	1275	.60
28	1903	.69	1759	.80	2023	1.05	1917	1.50	2025	.70
30	2893	.81	2534	.95	3325	1.28	2909	1.92	3220	.85
32	4414	.95	3737	1.09	4876	1.63	4654	2.55	5110	1.08
34	6400	1.18	6168	1.47	7757	2.18	7111	3.00	8120	1,45
36	9846	1.44	7877	2.00	11907	2.92	10039	4.00	12890	1.97
38	13848	2.15	10666	3.80	16516	4.18	14212	5.62	20490	2.79
40	24381	3.00	14222	5.60	26947	6.10	21333	7.73	32560	4.06

Marble Panels.

Marble Panels, either square or rectangular, for mounting apparatus, can be furnished as follows with all holes drilled, bevel edges, crated, F.O.B. Boston:—

		ERMONT TABLETS.	WHITE ITALIAN TABLETS.
		\$3.00 per square foot	\$3.30 per square foot
		3.30 per square foot	3.60 per square foot
11	in. thick	4.00 per square foot	4.25 per square foot

The above prices do not apply to pieces of less than 2 square feet, or to small pieces with an extraordinary amount of drilling.

The approximate weight of tablets can be figured on the basis of 15 pounds per square foot, one inch in thickness.

A drawing showing size and location of all holes must accompany your order.

Look over our index-Pages 111 and 112.

Marble Bases.

			lity "Electric Blue" marble bases, polished on one side are slightly bevel.	and all
Cat.	No.	56.	Base, 3 inches by 5½ inches, ¾ inch thick	\$0.70
Cat.	No.	57.	Base, 3½ inches by 6 inches, ¾ inch thick	.70
Cat.	No.	58.	Base, 5 inches by 9 inches, $\frac{\pi}{8}$ inch thick	1.05
			Flexible Couplings and Hubs.	
Cal.	No.	61.	These flexible couplings are useful for driving any device which it is desired to connect directly to a motor without accurately lining them up, such as connecting a small dynamo to a motor or water motor, synchronous spark gaps, etc., not requiring over 1/10 H.P. Always give diameter of both shafts in ordering. Price of Coupling, complete	\$2.50
Cat.	No.	62.	Hub only (being one side of coupling No. 61), to which a disc or any other device may be screwed for rotating same on motor shaft. Give size of shaft when ordering. Price each	1.00
			Insulating Materials.	
Cat.	No.	60.	Friction Tape, best quality, large half pound roll. Each	\$0.23
Cat.	No.	60A.	Friction Tape, in small one ounce rolls	.03
Cat.	No.	61.	Oiled Linen Tape, 1 inch wide, per yard, .05; per roll, 72 yards	1.50
Cat.	No.	62.	Oiled Linen, 3 feet wide, any length, per sq. yard	.50
Cat.	No.	63.	Oiled Paper, .003 in: thick, for insulation between layer wound coils and for general insulation. 4 inches wide, per yard .01; 2½ inches wide, per yard, .00½; 1½ inches wide, .00½.	
Cat	No.	64.	Flexible Micanite Sheet, readily bent into tubes, thickness, .035 inch, sheets 36 inches square, per sheet Strips 36 inches long, .20 per inch in width.	3.00
If yo	ou w	ant to	o make something electrical consult our book depa	rtment

Hard Rubber Sheeting and Rod.

	SHEETING. er inch on less square inches. Pric		Rop. Price is per inch on less than † foot. Thickness Price		
Thickness 1/8 1/4 3/8 1/2 5/8 3/4		Per sq. in. \$0.01\frac{1}{4} .02\frac{1}{4} .03 .04 .05 .06 .07\frac{1}{2}	inches 1/4 1/2 3/4	Per ft. \$0.16 .26 .44 .85	Per in. \$0.03 .05 .08 .15

NOTE: We can furnish hard rubber sheet highly polished on all edges and one face at an additional cost of 40c per sq. ft. or 1c per sq. in. on less than 40 sq. in.

Hard Rubber Tubing.

Outside Diameter	Price is per inch in less Inside Diameter	than one-half foot. Price per foot	Price per inch
1/8 inch	1/16 inch	\$0.22	\$0.03
1/4	1/8 "	.40	.06
5/16 "	3/16 "	.48	.06
1/2 "	3/16 "	.82	.10
5/8 "	3/16 "	.88	.10
3/4 "	1/2 "	1.00	.15
11/4 "	1 "	1.50	.20
2 "	11/2 "	2.65	.40
3 "	21/4 "	6.00	.70

NOTE: Most sizes rubber tube are not carried in stock and are supplied only a reasonable delay.

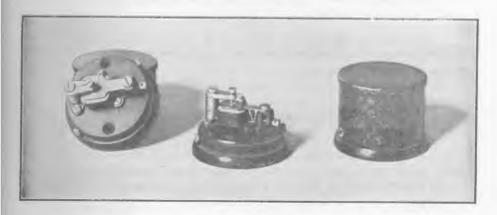
Bakelite Fibre Sheet.

For electrical work this material is unequalled. Hard rubber will turn gree and rusty with age and will melt with heat; black fibre will absorb moisture, wil warp and shrink, and will not take a good finish, while this new substance will not absorb moisture, will not warp or shrink, is not affected by heat, cold or acid will take a beautiful satin finish, and will not lose its color or lustre. While more expensive in first cost it will prove cheapest in the long run, and as an insulate will be found better than rubber or fibre.

will be los	and bec	ici tilati	Thickness	Price per sq. in.	Price per sq. ft
Cat. No.	B. D.	18.	1 inch	\$0.02	\$1.40
Cat. No.		14.	1 inch	.03	2.80
Cat. No.		12.	inch inch	.05	5.50
Cat. No.	B. D.	34.	a inch	.07	7.75

Don't spoil that instrument you are making by using inferior materialour parts are the best that money can buy.

High Frequency Buzzer.



This buzzer gives a very high pitched tone, operates on a very small amount of current, and is largely used in the United States Navy and elsewhere for test circuits.

Low Voltage Condensers.



These condensers are tested for a voltage of 500 and have a special grade of wax paper dielectric coated with foil. The condenser measures 5 inches high, 2½ inches wide, ¾ inch thick, and may be used on telephone circuits, across the vibrators of induction coils to prevent sparking, across mains supplying high frequency apparatus to prevent surges, and for a wide variety of similar purposes. Cat. No. E. S. 355. Condenser, capacity 2 microfarads...... Price \$0.90

Prices of other capacities on application.

See our less expensive buzzers on page 75.

Finished Wood Cabinets for Instrument Mounting.

The following cabinets and bases are all of high grade construction and finish and are suitable for use with instruments of the best construction. All dimensions given are inside dimensions.

Quartered Oak Cabinets.

25% inches long, 7 inches high, 7% inches wide. Made of % inch stock, fu	-
ished all over outside and inside of cover, cover hinged, bottom fastened on, part	-
tion of \$\frac{1}{8}\$ inch whitewood, \$10\frac{1}{2}\$ inches from one end, partition may be removed.	
Price \$6.0	0

Solid Mahogany Cabinets.

123 inches long, 75 inches wide, 8 inches high, made of 5 inch stock,	
cover screwed on, outside finished all over. Price each	\$4.00
14 inches long, 6% inches wide, 6% inches high, made of % inch stock,	
cover screwed on, outside finished all over. Price each	3.50
104 inches long, 5½ inches wide, 5 inches high, made of § inch stock.	
cover screwed on, outside finished all over. Price each	3.00
54 inches long, 54 inches wide, 31 inches high, made of 1 inch stock,	
cover screwed on, outside finished all over. Price each	1.00
17 inches long, 54 inches wide, 6 inches high, made of ½ inch stock	0.00
cover hinged, finished all over outside and inside of cover. Price each	8.00

Solid Mahogany Rectangular Bases.

13½ inches long.	5½ inches	wide, 3 inch	thick, finished all	over. Price	
each					\$0.60
6 inches long, 44	inches wide	e. 🖟 inch thick	, finished all over.	Price each	.60

Solid Mahogany Round Bases.

9	inches	diame	ter,	1	inch	thick,	finis	shed	all	over.	Price	each			\$0.75
	No	thing	is	m	ore	beauti	ful	tha	n a	mal	hogany	cabinet	on	yo	ur
							in	stru	me	nts.					



Keystone Switches

Nickel plated Trimmings, Composition Base.

Cal.	No.	1626.	Keystone	Switch,	1	point,	Price - \$0.18
Cat.	No.	1627.	Keystone	Switch,	2	points,	.20
Cat,	No.	1628.	Keyatone	Switch,	3	points,	.25
Cal.	No.	1629.	Keystone	Switch,	4	points,	.40

Intercommunicating Telephone Switches.



This switch is made only in oak with nickel plated lever and contacts.

Cat. 1						Price
751.	Intercommunicating	Tel.	switch,	4	points.	\$0.45
	Intercommunicating					.49
753.						.55
754.	Intercommunicating					.62
755.	Intercommunicating	Tel.	switch,	10	points,	.72
756.						.82

Pearl Push Button.



Illustration full size.

This push fits into a 3 inch hole and is securely held by springs at the side. Center cannot turn and when engraved keeps in the right position. Pearl center with nickel plated trimmings.

Cat. No. 1300. Flush Push Button, Pearl center.

Price, \$0.15



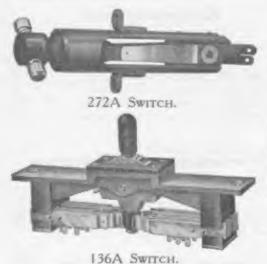
"Pullrite Switches"

I TO 4 BUTTON.

Pull out to turn on current, push in to turn off. For Battery currents only.

			One button switch,	Price	each	\$0.50
Cat.	No.	982.	Two button switch,	*4	8.6	1.00
			Three button switch,	les.	11.0	1,25
Cat.	No.	986.	Four button switch,	**	4.5	1.75

Our 19 3-blade instrument switch is used on all our high grade instruments.



Telephone Type Switches

These switches are for flush mounting in cabinets or otherwise and are very convenient for telephone circuits and Wireless Telegraph receiving circuits.

Cat. No. 272A. Switch as shown,

Price each \$0.90

Cat. No. 136A. Switch as shown.

Price each 2.50

Lightning and Static Protectors.

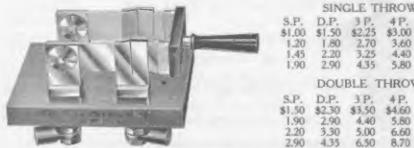
A small compact protector, which will protect any telephone circuit or wireless telegraph receiving set against high potential currents from lightning, static or atmospheric electricity or from induction from nearby transmitting sets. A trilling investment in this device will insure you against disastrous burn outs to your expensive instruments.

Cat. No. 60E. Lightning protector, Price each \$0.70



Knife Switches.

Unmounted-110-250 volts, not fused. Front or back connected (specify which)



	SING	GLE T	HROW	7
\$1.00 1.20 1.45	\$1.50 1.80 2.20	3 P. \$2.25 2.70 3.25 4.35	\$3,00 3,60 4,40	35 50
	DOU	BLE T	HROV	V
1.90	\$2.30	3 P; \$3,50 4,40 5,00	\$4.60 5.80	

Bakelite is the finest material for instrument panels.

Special Wireless Ground Switch.

600 volt 100 ampere knife switch, single pole, double throw, on insulating base, as required by the National Fire Underwriters, for grounding wireless telegraph antennae. Price each \$2.75



Baby Knife Switches.

These switches may be used on currents up to 125 volts and are mounted on porcelain base with holes for screwing down to switchboard or table.

SINGLE POLE



Cat. No. 1436. Cat. No. 1437. Cat. No. 1454. Cat. No. 1455.	15 amperes S.P.S.T., 30 amperes S.P.S.T., 15 amperes S.P.S.T., 30 amperes S.P.S.T., DOUBLE POLE	Price each \$0,34 .44 .60 .74
Cat. No. 1438. Cat. No. 1439. Cat. No. 1456. Cat. No. 1457.	15 amperes D.P.S.T., 30 amperes D.P.S.T., 15 amperes D.P.S.T., 30 amperes D.P.S.T., TRIPLE POLE	Price each \$0.42 .50 .74 .90
Cat. No. 1440. Cat. No. 1441.	15 amperes T.P.S.T., 30 amperes T.P.S.T.,	Price each \$0.90 1.10

Watch Case Buzzer

The base and cover are made from sheet brass polished and nickel plated. The operating parts are designed to generate a clear resonant sound which can be heard in any part of an ordinary sized office or room. Easily connected and reliable.

Size 2 1/8 inches diameter by 1 inch high.

Cat. No. 1936. Watch Case buzzer,

Price \$0.30





Nonpareil Bell and Buzzer.

The cover is tinned sheet steel black japanned, rigidly fastened to the base of black japanned steel, magnets are standard size and end of upper magnet is fitted with a copper cap to prevent armature sticking. Binding posts are non-turnable and every detail of the bell and buzzer is constructed for durability and satisfactory service. One cell of battery will operate either and as many as five cells may be used if desired.

Cat. 1	No.	1846.	Nonpareil Nonpareil Nonpareil	Bell, 3	inch	gong,	Price	\$0.25 .26 .33
			Nonpareil			0	14	.24

See our high frequency buzzer on page 71.



Call Bell Outfit.

This outfit consists of one iron box bell, 23 inch gong, one cell dry battery, one wooden push button, and fifty feet of insulated wire. Sufficient staples and printed instructions which will aid any one to put the outht in successful operation are also included.

Packed in strong strawboard box. Weight, 5 lbs. Cat. No. 1762. Call bell outfit complete,

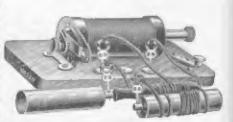
Price \$0.75

Standard Medical Induction or Shocking Coil.

Mounted on a polished hard wood base with two binding posts for battery and three recep-tacles for electrode cords. A switch is provided for opening and closing the battery circuit. One cell or two cells of battery can be used.

It is claimed that medical electricity will give relief from many common ailments and as a source of amusement the application of this current which is harmless will provide much fun and entertainment, Cat. No. 2235. Standard medical coil. \$1.25

Battery is not included in this outfit.





Current Tap.

Combined socket and attaching Plug N. E. C. Standard, 660 watts, 250 volts.

A simple and safe device for tapping and carrying the current from any electric light fixture to a small motor, drop light or other electrical devices without the loss of light from the lamp already in



Attachment Plug.

Moulded Material.

N. E. C. Standard-660 watts, 250 volts.

A small separable plug made of black moulded material under great pressure which is extremely tough, will stand hard usage, and is one of the smallest, neatest, and most substantial plugs made. It has a smoothly finished surface resembling hard rubber and it is so arranged that it cannot be short circuited.

Use our flexible lamp cord-page 78-with your current tap or Attachment plug.

Hard Rubber Wire Connectors for Battery Currents.



Style F 81	Style F 82	Style F 90	Style F 89	
Cat. No. F 81.	½ inch double pole,	set screw connection.	Price each	\$0.18
Cat. No. F 82.		, set screw connection,		.25
Cat. No. F 90.		connector, set screw		-43
	Price each			.30
Cat. No. F 90 C		n connector, set screw		.40
Cat No E 89		connector, set screw		.40
Cat. 140. 1 07.				.35
Cat. No. F89 C	. Double Ediswar	connector, set screw	connection.	***
	Price each			.50

High Tension and Low Tension Packard Cable.

For automobile and motor boat service and for wiring spark coils, high tension transformers or other high frequency or high tension circuits nothing is better than these cables. They are insulated with several layers of pure para rubber properly compounded and protected by heavy braids saturated with many coats of enamel, which is oil, heat and water proof. You can only get these qualities by using genuine Packard cable.



Cat. No. P 898. Combination High ten-	
sion cable, suitable for all kinds of severe high tension service, 31/64 inches diameter. Price per foot, 20c; price per 50 ft. coil	\$7.50
Price per foot, 20c; price per 50 ft coil	7.50
for those who desire a plain unpro- tected cable, 18/64 inch diameter. Price per foot, 16c; price per 50 ft.	4.00

See our small dynamo lighting plant-Page 82



Cat. No. P 990. Combination Lighting cable No. 12. One conductor, 16/64 inch diameter. Price per foot, 11c; price per 50 ft. coil...........

4.25

Two conductor, 30/64 in. diam.
Cat. No. P 991. Price per foot, 24c;
price per 50 ft. coil..........

9.00

Flexible Lamp Cord.

Miniature Battery Rheostat.



Suitable for regulating the voltage of battery circuits in connection with

miniature lamps, small motors, etc.

The change in resistance is gradual as the lever passes over the coiled resistance wire, from 0 to 30. When resting on "off" the circuit is open. In any other position the circuit is closed.

Binding posts and lever nickel plated. Porcelain base. Diameter, 31 in. Experimenters, physicians, surgeons, workers in laboratories, etc., will find this a very useful and efficient miniature rheostat.

List No.

Price

2110. Miniature Battery Rheostat.....

\$0.60

Spark Coils.



These coils are designed especially for good service and satisfaction. The rated spark length is guaranteed between needle points, if the proper number of good dry batteries is used to operate the coil. The spark produced is heavy

The contact points on the interrupter are heavy platino-iridium, which is the best material known for the purpose. The interrupter is so designed that it will

not "stick."

Our No. 703 Flashlight Battery is just the thing for an audion detector-40c each.

All our coils are furnished complete with primary condenser.

These coils are designed for use in connection with dry, wet, or storage batteries, the proper number of which we show below for each coil. We do not guarantee the coils if operated in connection with electrolytic interrupters of any description.

List I												Price
459.	Spark coil,	inch.	operates or	5	dry	cells.	1 2			 1 1	 P 1	 \$3.45
460.	Spark coil,	inch	operates or	1 5	dry	cells.	1 5		ı a		 	4.05
	Spark coil,											
462.	Spark coil, I	inch	operates or	1 6	dry	cells.	. +	7 7		 P -	 	 5.40
463.	Spark coil, 1	inch,	operates or	6	dry	cells.					 	 8.00
464.	Spark coil, 2	inch	operates or	8	dry	cells.	h 4			 	 1 1	 10.00
495.	Spark coil, 3	inch	operates or	8	dry	cells.		4 1	 			 21.00
496.	Spark coil, 4											

Telegraph Keys and Sounders.

The fascination of the electric telegraph appeals to all, from the school boy to his parent. Few realize, however, to what extent the "song of the wire" is interwoven with entire social and commercial fabric, how our modern railroad systems could not operate without it or how bare would be our largest newspapers without their net work of telegraph wires gathering news from all parts of the world. Many of our greatest railroad presidents and financiers began life as telegraph operators and to those who desire to follow in their footsteps and pursue the fascinating study for instruction, amusement, or as means of communicating with a friend or neighbor we offer an unexcelled line of instruments at very moderate prices.

Steel Lever Keys.



The lever and trunnion made of one piece of finely wrought steel polished and nickel plated, giving a perfect bearing, avoiding the loose trunnion trouble so common in other types. All other metal parts finely finished and lacquered. Each key is fitted with an improved adjustment spring holder. Sticking is prevented by hardened platina points.

Both knobs are of imitation rubber composition. These keys are light and durable and their quick action is recognized by experts and operators to the extent that the Postal and Western Union Tel. Companies have adopted this type and are using thousands of them in their service.

Cat.	No.	103.	Key with nickel-plated lever. Brass frame with legs.	AT 10
Cat.	No.	105.	Price Same as No. 103 but all nickel-plated. Price	1.40
	12	108.	Key with nickel-plated lever. Brass frame, legless Price Same as No. 108 but all nickel-plated. Price	1.20

See our books on telegraphs-wire or wireless.

Improved Giant Sounder.



This sounder is unequalled for quick action, loudness, and clear tone. Its proportions are scientifically correct and this type has been adopted by the Western Union and Postal Telegraph Companies and nearly all railroads.

The clear and distinct sound makes it very popular with expert telegraphers.

Cat. No. 110. Improved Giant Sounder, 5 ohms. Price....... \$1.60

Cat. No. 112. Improved Giant Sounder, 20 ohms. Price....... 1.75

Giant Combination Sounder and Key.



IMPROVED GIANT SOUNDER AND STEEL LEVER KEY.

Combination Set.

The neatest, most symmetrical and desirable outfit manufactured. The set comprises the standard improved giant sounder finely finished with rubber covered coils mounted on polished mahogany base with regular steel lever, solid trunnion key.

The practical telegrapher appreciates the advantage of operating the best instrument made and realizes the lead he has over the user of a cheaply constructed affair while the student will be better equipped for practical service after learning on this instrument as the sounder and key are standard types.

A copy of "Philosophy and Practice of Morse Telegraphy" (42 pages) is furnished free with each instrument.

Cat. No. 182. Giant Combination Sounder and Key, 5 ohms. Price \$2.75 Cat. No. 183. Same as No. 182, wound for 20 ohms. Price. 2.90

Get a copy of our new wireless catalog.

Excelsior Learners Instrument.



The Excelsior Learners Instrument is designed to fulfill all the requirements of a short line apparatus at the least possible cost to the purchaser.

All the working parts, including key lever, sounder lever, sounder yoke or anvil, adjusting screws, etc., are finely finished composition metal, such as used in all high grade instruments. The frames for holding sounder lever and key lever are stamped from wrought iron and heavily japanned. The assembly insures permanent adjustment of the side motion of both key and sounder as there are no screws to loosen.

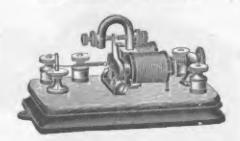
The base is of highly polished mahogany.

This is a first-class, neat, and compact learners instrument and will give entire satisfaction on lines up to five miles in length.

A copy of "Philosophy and Practice of Morse Telegraphy" is included free with each instrument.

Cat. No. 180. Excelsior Telegraph instrument complete, 5 ohms. Price \$1.15 Cat. No. 181. Same as above, 20 ohms. Price 1.30

Improved Pony Relay.



CLOTH COVERED MAGNETS.

This relay is an improvement on the standard Pony type and combines the good points of the Pony with those of the large size instrument. It has adjustable magnets and one-piece armatures and levers. It is finely finished and mounted on polished mahogany base with enameled iron sub-base.

Cat.	No.	162.	Improved								43.35
Cat.	No.	163. 164. 165.	Improved Improved	Pony Pony Pony	Relay, Relay, Relay,	20 50 75	ohms, ohms, ohms,	lines lines lines	up to 10	miles miles	\$2.25 2.25 2.40 2.55

Our storage batteries are unexcelled-prices moderate.

Small Power Plant



For automobile, motorcycle, motor-boat, lighting and small stationary plants and battery charging.

This apparatus is not a toy but is a perfect machine substantially built and of high quality throughout.





The generator is entirely enclosed in a die cast, case is equipped with wick feed oilers on the plain bearing machine and is finished in black enamel. When running at its normal speed of 1800 R.P.M. its output is 7 volts and 7 amperes or 49 watts. As the current consumption of 6 volt tungsten lamps is 1 watt per candle power this machine will give you almost 50 candlepower or enough to light a small cottage or camp, or an automobile or motor-boat.

We urgently recommend that the generator be purchased with ball bearings as the small additional cost will be more than made up in longer life and quiet,

See our line of genuine Packard Cable for Ignition and Lighting—page 77. frictionless operation. When used on an automobile or motor boat it takes so little power that the running of the motor is not affected.

Regardless of its small size, this generator will give as good a light as any other, and its small size and weight is a great advantage.

Specifications: Weight, 9½ lbs. Total height, 5 inches. Diameter of case, 4 inches. Length, 6 inches. Diameter of pulley, 2 inches. Diameter of shaft, § inch. Total shaft length, 7 inches. Generous bronze bearings.

THE GOVERNOR.

The output of a generator depends upon its speed and the rated output should never be exceeded as this would be overloading and abusing the generator. Therefore a governor is always necessary except for stationary or motor-boat use where the engine speed is practically constant and the generator speed is regulated by the size of the pulley.

We supply two forms of governors, one a mechanical governor which works on an entirely new principle which controls the output to a nicety regardless of the speed of the engine. It is finished in nickel, is entirely enclosed, ball bearing belt drive, cannot get out of order and by turning a nut the generator output may be varied instantly from one ampere to the full capacity of the generator. Where the mechanical governor is used in connection with a storage battery an automatic cut out must be used as described later.



We also furnish a combination electrical governor and cut out which is connected to the generator field coils and acts electrically to keep the generator output at a certain fixed point and which does not require any additional cut out when a storage battery is used. Inasmuch, however, as it does not affect the speed of the generator but only controls the output, it must be used only with the ball bearing generator. It takes the place of both the mechanical governor and automatic cut out and leaves the generator shaft free for any size or type of pulley, sprocket or gear. It is furnished entirely enclosed and is easily mounted in any out of the way place.

Cat.	No.	69.	Regular mechanical governor with 2 inch grooved or	
_			flat pulley	\$6.00
			Mechanical governor with Porcupine pulley	6.25
Cat	No.	70.	Combination electrical governor and cut out	8.00

Whether you use our lighting system or another, our "Type C" gas filled lamps will give you almost twice the light.

THE AUTOMATIC CUT OUT.



When the speed of the generator falls below that necessary to generate a voltage in excess of the voltage of a storage battery connected to it the battery will discharge back through the generator.

To prevent this an automatic cut out is employed and is placed on the line between the generator and battery. It automatically makes the circuit when the generator attains sufficient speed and breaks it when the generator slows down or stops. It is beautifully made, has double contacts of carbon and bronze and is entirely enclosed by a stamped steel case which fastens to the heavy fibre case by a bayonet lock.

THE AMMETER.



We recommend the use of meters in all cases as this affords positive proof of the amount of current being generated or consumed and shows at a glance whenever it is necessary to tighten the belt or adjust the governor. The meter we furnish while low in price, is perfectly reliable, is extremely well made, and is finished in nickel. It reads from 0 to 15 amperes and has a double scale showing both charge and discharge where a storage battery is used.

THE STORAGE BATTERY.

While the dynamo will furnish light from lamps so long as it is running a much steadier light is obtained where a storage battery is used and the battery also permits the use of lamps at times when it would be inconvenient or impossible to operate the dynamo such as in the case of a break down to an automobile or motor-boat engine or in the case of stationary plant where it was designed to run the dynamo only in the daytime for charging the battery which in turn would furnish electrical energy at night. Our storage batteries are designed for lighting purposes and hard service and will supply heavy current without injury to the battery.

See our complete line of battery meters on another page.

A six volt battery will light automobile type tungsten lamps for approximately the following number of hours:

	4 Candle Power Lamp		Candle wer Lamp	15 Candle Power Lamp			0 Candle Powe Nitrogen Lamp
60 amp. hr. battery	1-90 hrs. 2-45 " 3-30 " 4-22 "	2	.60 hrs. .30 " .20 "	1-24 hrs. 2-12 " 3-8 " 4-6 "	1-30 2-15 3-10 4-7	44	1.14 hrs. 2.7 " 3.4 " 4-3 "
80 amp, hr. battery	1-120 hrs. 2-60 " 3-40 " 4-30 "	2	-80 hrs. -40 " -27 " -20 "	1-32 hrs. 2-16 " 3-11 " 4-8 "	1-40 2-20 3-13 4-10	hrs.	1-18 hrs. 2-9 " 3-6 " 4-4 "
100 amp. hr. battery	1-150 hrs. 2-75 " 3-50 " 4-37 "	2.	100 hrs. .50 .33 .25	1-40 hrs. 2-20 " 3-13 " 4-10 "	1-50 2-25 3-17 4-12	hrs.	1-22 hrs. 2-11 " 3-7 " 4-5 "
	No. of Cells	Volta	Ampere Hrs	Height	Width	Length	Price
Cat. No. K 7 Cat. No. K 9 Cat. No. K 11	3 3 3	6 6	60 80 100	91 91 91	61 61 71	9 1 11 1 13 1	\$15.00 20.00 25.00

Note: About once in two weeks add enough distilled or rain mater to cover the top of the plates. Tap water will ruin your battery. Do not add acid. A little vaseline on battery terminals will prevent their corrosion.

PORCUPINE DRIVE.

The illustration at the top of page 82 shows the generator applied to a Ford car by means of the Porcupine drive. It can be applied by any one in a short time by use of a wrench only.

Note the spurs projecting from the generator pulley which fit into corresponding holes in the belt. There are always three or four of these holes occupied by spurs so that there is positively no belt slippage. This drive is practically the equivalent of a leather chain with a sprocket instead of a pulley on generator shaft.

The advantages of this drive over other devices such as chains, gears and sprocket are lower cost, positive drive, ability to use small generator pulley without slippage, noiselessness, ease of application, and less wear on bearings because a looser belt can be used.

If you order from us we won't be satisfied until you are.

BRACKETS FOR ATTACHING DYNAMO.

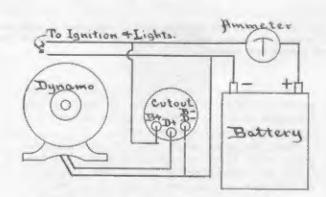
For Ford, Saxon or Metz Cars.

Special brackets are furnished for attaching the dynamo for Ford, Saxon and Metz cars only, but this generator is being sold for all makes and can be easily attached to any car by the exercise of a little ingenuity.

Cat.	No.	75.	Ford, Saxon or Metz brack- et (specify which)	\$2.50
Cat.	No.	76.	Ford, Saxon or Metz Belt (specify which)	1.25
Cat.	No.	77.	Metz Driving Pulley to fit	1.25

DIAGRAM OF WIRING.

For any car, motor-boat or other installation, red cord or binding post of generator and red post of battery are positive (+).



Complete Lighting Systems.

FORD, METZ OR SAXON.

Consists of Ball Bearing Generator, Governor, with Porcupine Pulley, Bracket, Belt, Automatic cut out, Ammeter and 6 volt 60 ampere hour storage battery.

Cal.	No.	78.	Complete Automobile Lighting System, as above	\$48.50
Cat.	No.	79.	Same as No. 78, with 80 Amp. hr. Battery	53.50
Cat.	No.	80.	Same as No. 78, with 100 Amp. hr. Battery	58.50

Our "Pullrite" switches are just right for a 6-volt battery system see page 73.

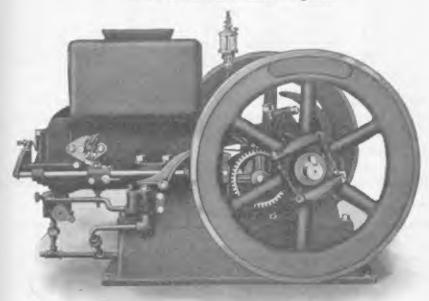
Complete Stationary Plant.

Consists of Ball Bearing Generator, Combination Electrical Governor and cut out, Belt, Ammeter, 1 H.P. Gasoline Engine with spark coil and 6-volt 60 ampere hour storage battery.

Cat.	No.	81.	Complete Stationary Lighting Plant	\$64.00
Cat.	No.	82.	Same as No. 81, with 80 A. H. Battery	69.00
			Same as No. 81 with 100 A. H. Battery	

NOTE: Any of above stationary outfits can be furnished without gasoline engine at a reduction in cost of \$20.00 and can be driven from any other source of mechanical power.

Blue Line Gasoline Engines.



Strong. Built for service. Not an untried product.

Reliable. Full measure of power. Nothing but satisfied customers.

This engine was placed on the market to meet the growing demand for a medium weight compactly built engine for general service that can be sold at a moderate price but that may be depended upon for satisfactory service under all conditions. This engine will bear the closest inspection as to design, workmanship, material and finish. By skillful design and improved methods, we are enabled to offer an engine that appeals at once to the most critical buyer who demands the greatest possible value for his money. Each engine is equipped with muffler, dry batteries, solid iron pulley, wrenches, oilers, and oil can. Fuel tank

Our business rests on a foundation of satisfied customers.

in base of engine of sufficient capacity for one day's run in sizes of 9 H.P. and smaller. 12 and 15 H.P. engines are supplied with 60 gallon outside fuel tank. High grade make and break igniter with spark retarder for starting, cylinder head thoroughly water jacketed, carburetor has only one adjustment, is not affected by climatic conditions and engine will start readily in all weather. Large Hopper cooler and speed changing lever which may be adjusted while engine is running. Heavy bearings set at 30° angle; crank shaft forged from open hearth steel heat treated, machined, ground and polished.

н. Р.	Cat. Nos.	Sh. Wt. Lbs.	Cu. Ft.	Speed R. P. M.	Floor Space in Inches	Size F Inci diam.		F. O. B. Boston
1	216	265	20	600	20 x 40	4	3	\$50.00
2	200	375	22	500	26 x 37	5	4	70.00
3	201	550	28	400	28 x 40	8	4	120.00
4	202	900	35	375	32 x 48	10	4	170.00
6	203	1400	48	360	35 x 58	12	6	220.00
9	204	2200	80	300	41 x 60	18	8	350.00
12	205	3000	110	280	48 x 68	20	10	500.00
15	206	3400	120	280	48 x 72	22	10	600,00

Lighting Dynamos.

Constant duty.

Highest quality.



Multipolar.

Low in price.

These generators are wound for 40 volts direct current which is the proper voltage for use with 32 volt storage battery. This voltage is recommended for the reason that lamps, fans, motors, cooking and heating utensils and nearly all electrical devices may be obtained for use on this voltage. These dynamos may be furnished for any other voltage however, at small additional cost; prices on application. When used in connection with our Blue Line Gasoline engines and our switchboard a complete lighting and power plant is available at a cost within the reach of every one. Each dynamo is furnished complete with a base and pulley for belt connection to any moving shaft or gas engine.

We solicit your correspondence regarding special lighting equipments of all kinds and will give personal attention to your wants either for complete equipments or special generators for any purpose of the size or type desired as listed by us below.

Electric light is the only safe light.

Cat. No.	Speed R. P. M.	Volts	Amps.	Maximum Number of 12 C. P. 15 Watt Lamps	H. P. Required to Drive	Price F. O. B. Boston or Warren, O.
W 8	1800	40	15	30	1	\$47.50
D 1700	1700	40	37	75	3	76.00
DE 1500	1500	40	75	150	5	119.00
E 1700	1700	40	100	200	6	148.00

NOTE: Prices of lamps, sockets, wire, etc. fluctuate with the market and will be gladly lumished upon request.

See also in our book department "Electric Light for the Farm," 89 pages, 65 illustrations, complete information regarding storage batteries, wiring and installation for country houses, farms, small settlements, yachts, etc. Price \$1.00.

Switchboards.

We have had a long experience in building small switchboards for all purposes and can supply any type of board either for battery or dynamo system or for high tension or power purposes. All of our switchboards are of polished blue Vermont marble and are both practical in use and handsome in appearance. Each board listed below is intended for use with our 32 volt lighting system and consists of necessary meters, automatic cut out or circuit breaker, pilot lamp, switch, and binding posts.

The cut out or circuit breaker automatically disconnects the dynamo from the storage battery should the engine slow down or stop but leaves the lights connected to the battery so that they are not affected, at the same time preventing the current from the battery running the dynamo as a motor. It automatically closes as soon as the generator again comes up to speed.

Cat.	No.	C. E. 60	O. Marble switchboard with automatic cut out, ammeter showing both charge and discharge of battery, voltmeter, pilot light, switch and binding posts for 32 volt lighting system up to 40 amperes. Price	.50
Cat.	No.	C. E. 60	Marble switchboard, same as above, for 75 ampere plant. Price	.00
Cat.	No.	C. E. 60	2. Marble switchboard, same as above, for 100 ampere plant. Price	.50

Pin your faith to "Quality" and ever more be merry.

Portable Type Storage Batteries.



The mechanical construction of this battery is designed to stand hard service to which it may be subjected in automobiles, motor boats, or similar portable work. Extra heavy plates are used, insuring long life and full capacity.

The jars are of pure Para rubber, and the treated oak cases are so constructed

as to allow for temperature changes, preventing leaky batteries.

Batteries are supplied in two types, the sparking batteries being intended for gas engine ignition, small spark coils, and all purposes where only a small current is used, while the lighting batteries will supply heavy currents for small lighting and power purposes without injury to the battery and for a much greater time at one charge.

We guarantee this to be a good battery at a moderate price, and that it will

give satisfaction if used with ordinary care.

AND NO.	LLS			DIMEN	SIONS OV F BATTE	ZERALL RY	Z_	1 3 . E	
TYPE AND PLATE	NO. OF CELL	as os	VOLTS	AMPERE	HEIGHT	WIDTE	LENGTH	WEIGHT IN POUNDS	PRICE F. CAMBRID MASS
K-7 K-9 K-11 K-13 K-15 K-75 K-95 K-115 K-135 K-155	3 3 3 3 16 16 16 16	6 6 6 6 32 32 32 32 32	60 80 100 120 150 60 80 100 120 150	94 94 94 94 94 94 94 94	61 61 71 71 71 72 33 33 40 40 40	9 ½ 11½ 13½ 15½ 17½ 11¼ 13½ 15½ 17½ 11¼ 13½ 15½ 17½ 17½ 17½ 17½ 17½ 17½ 17½ 17½ 17½ 17	33 42 58 62 68 165 210 290 310 340	\$15.00 20.00 25.00 27.00 30.00 75.00 100.00 125.00 135.00 150.00	

Hard Rubbe	Wood Cases							
ASB1	3	6	60	81	6	8	26	\$12.00
ASB2	3	6	80	81	78	9	35	16.00
ASB3	3	6	100	81	81	91	43	20.00

See our line of 6-volt lamps.

FUN WITH MAGNETISM.

This outfit contains 32-page book of instructions, with 45 illustrations, together with a complete set of apparatus for performing 61 fascinating experiments. It will give you some new ideas about magnetism and start you at the right place in your study of electricity. Think what that of electricity. means-to start right!

The book contains experiments with the horseshoe magnet, with bar magnets, with floating magnets, etc., etc., thus giving a practical knowledge of the subject; and it is all done in such an interesting way that one can't help remembering it. Every experiment clinches some fact and every fact is important.

Amusing Experiments; Something for nervous people to try; The Jersey Mosquito; The Stampede; The Runaway; The Dog-Fight; The Whirligig; The Naval Battle; A String of Fish; A Magnetic Gun; A Top Upsidedown; A Magnetic Wind-mill; A Compass Upsidedown; The Magnetic Acrobat; The Busy Ant-Hill; The Magnetic Bridge; The Merry-Go-Round; The Tight Rope Walker; A Magnetic Motor Using Attractions and Repulsions—and 43

others.
No. R1. Complete Outfit,
"Fun with Magnetism".... \$0.25

FUN WITH ELECTRICITY.

The Author of this fun with science series has spent a great deal of time and money in experimenting to devise apparatus that will do the proper work and be at the same time, simple and cheap, and in no outfit has he succeeded better than in Fun with Electricity. When you think of an outfit retailing for 50 cents and covering the whole subject of "Static Electricity" giving 60 scientific experiments upon its production, conduction and induction, with a 55-page book of instructions with 38 drawings, and a complete set of ap-paratus of 20 articles for performing these 60 experiments you will understand why the sales of this outfit have been enormous. As the sub-ject is presented in a fascinating way-and not as mere dry scienceevery one likes to do the experiments. No wonder these sets are highly praised by parents and edu-

highly praised by parents and edu-cators in all parts of the country.

There is Fun in these Experi-ments: Chain Lightning; An Elec-tric Whirligig; The Baby Thunder-storm; A Race with Electricity; An Electric Frog Pond; An Electric Ding-dong; The Magic Finger; Dad-dy Long Legs; Jumping Sally; An Electric Kite; Very shocking; Con-densed Lightning; An Electric Fly densed Lightning; An Electric Fly Trap; The Merry Pendulum; An Electric Ferry-Boat; A Funny piece of paper; A Joke on the Family Cat; Electricity Plays Leap-Frog; Lightning Goes Over a Bridge; Electricity Carries a Lantern; and 40 others.

There isn't an outfit anywhere at any price that gives better value for the money. An ideal present for a boy.

R2. Complete Outfit. "Fun with Electricity" \$0.50 If sent by mail postage extra

FUN WITH PUZZLES.

Here is an outfit that every boy and girl should have, for it is amusing, instructive, and educational. It is real fun to do puzzles and to puzzle your friends, and this book con-tains some real brain teasers that will make you think. This book contains 15 chapters, 80 pages, and 128 illustrations, and measures 5 by 71 inches. If you can't do any par-ticular puzzle you will find its solution in the key which is bound with the book. If you want to win prizes by doing the puzzles in the maga-zines, you will find this book of 400 puzzles a regular school of puzzles that will give you a thorough training for this kind of work. The book alone is well worth the price, to say nothing of the outfit of numbers, counters, pictures, etc.

Contents of Book: Chapter (1)
Secret Writing. (2) Magic Triangles, Squares, Rectangles, Hexagons,
Crosses, Circles, etc. (3) Dropped
Letter and Dropped Word Puzzles.
(4) Mixed Proverbs, Prose and
Rhyme. (5) Word Diamonds,
Squares Triangles and Phomboids Rhyme. (5) Word Diamonds, Squares, Triangles, and Rhomboids. (6) Numerical Enigmas. (7) Jum-bled Writing and Magic Proverbs.

No boy should be without these "Fun" Books.

(8) Dissected Puzzles. (9) Hidden and Concealed Words. (10) Divided Cakes, Pies, Gardens, Farms, etc. (11) Bicycle and Boat Puzzles. (12) Various Word and Letter Puzzles. (13) Puzzles with Counters. (14) Combination Puzzles. (15) Mazes and Labyrinths. Secret Writing is explained in this book and it shows how you can write letters to your how you can write letters to your friends and be sure that no one can read them unless they are also in the secret. This one thing alone will give you a great deal of enjoyment. Get this outfit and have some

No. R3. Complete Outfit, "Fun with Puzzles"..... \$0.25 If sent by mail, postage extra

FUN WITH SOAP BUBBLES.

Fancy bubbles and films are not easily blown without special apparatus, and even with the proper outfit one must "know how." That's why we furnish a 16-page book with every outfit to show how to do it. With the aid of the 21 illustrations and the directions you can produce remarkable results that will surprise and entertain your friends. A child can do it as well as a grown person.

Soap-Bubble parties using these outfits create real sensations. Why not be the first in your town to give

"Fun with Soap-Bubbles Party"? Contents of Book: Twenty-one il-Contents of Book: Iwenty-one flustrations; Introduction; The Colors of Soap Bubbles; The Outfit; Soap Mixture; Useful Hints; Bubbles Blown with Pipes, Bubbles Blown with Straws; Floating Bubbles; Baby Bubbles; Smoke Bubbles; Bombshell Bubbles; Dancing Bubbles; Bubble Games; Supported Bubbles; Bubble Cluster; Supported Bubbles; Bubble Cluster; Supported bles; Bubble Games; Supported Bubbles; Bubble Cluster; Suspended Bubbles; Bubble Lamp Chimney; Bubble Lenses; Bubble Basket; Bubble Bellows; To draw a Bubble through a ring; Bubble Acorn; Bubble Bottle; A Bubble within a Bubble; Another Way; Bubble Shade; Bubble Hammock; Wrestling Bubbles; A Smoking Bubble; Soap Films; The Tennis Racket Film; Fish-net Film; Penshaped Film; Bow and Arrow Film; Bubble Dome; Double Bubble Dome; Pyramid Bubbles; Turtle-Back Bubbles; Soap Bubbles and Frictional Electricity. Bubbles and Frictional Electricity.

There is nothing more beautiful than the airy-fairy soap-bubble with its ever-changing colors. This outfit gives the best possible amusement for old and young.

No. R4. Complete Outfit, "Fun with Soap Bubbles" \$0.25 If sent by mail postage extra Three extra packages of Prepared Soap, postpaid...

FUN WITH SHADOWS.

No wonder shadow making has been popular for several centuries! What could give keener delight than comical shadow pictures, panto-mimes, entertainments, etc.? Professional shadowists use wires, forms and various devices to aid them and that is why they get such wonderful results on the stage. Do you want to do the same thing right in your own home and entertain your friends with all kinds of fancy shadows? You can do it with this outfit, for the book contains 100 illustrations and diagrams with directions for using the numerous articles included in the box. You will be surprised to see how easily you can make these funny shadows with the aid of the outfit. Better get one now and make shadows like a professional.

The Outfit contains everything necessary for all ordinary shadow shadow entertainments, lays, etc. The following pictures, shadow plays, etc. The following articles are included: One book of instructions called "Fun with Shadows," 1 Shadow Screen, 2 sheets of Tracing Paper, 1 Coil of Wire for Movable Figures, 1 Cardboard frame for Circular Screen, 1 Cardboard frame for Circular Screen, 1 Cardboard house for Stage Scenery, 1 Jointed Wire Fishpole and Line, 2 Bent wire Scenery Holders, 4 Clamps for Screen, 1 Wire Figure Support, 1 Wire for Oar, 2 Spring wire Table Clamps, 1 Wire Candlestick Holder, 5 Cardboard Plates containing the following printed figures that should following printed figures that should be cut out with shears: 12 character Hats; 1 Boat; 1 Oar-Blade; 1 Fish; 1 Candlestick; 1 Cardboard Plate containing printed parts for making movable figures.

No. R5. Complete Outfit, "Fun with Shadows"..... \$0.25 If sent by mail, postage extra .07

These books will provide an evening's amusement for the entire family.

FUN WITH PHOTOGRAPHY.

Popular pastimes are numerous, but to many there is nothing more fascinating than Photography. The magic of sunshine, the wonders of nature, and the beauties of art are tools in the hands of the amateur photographer. If you want to get a start in this up-to-date hobby, this outfit will help you. You will enjoy the work and be delighted with the beautiful pictures you can make.

The outfit contains everything necessary for making prints together with other articles to be used in var-The following things are ious ways. included: One illustrated book of instructions called "Fun with Photography," I Package of Sensitized Paper, I Printing Frame including Glass Back, and Spring, I set of Masks for Printing Frame, I set of Patterns for Fancy Shapes, I Book of Negatives (Patented) Ready for use, 6 sheets of Blank Negative Pa-per, 1 Alphabet sheet, 1 package of card mounts, 1 package of folding mounts, 1 package of "Fixo."

Contents of Book: Chapter I-Introduction; Photography; Magic Sunshine; The Outfit. II—General Instructions; The Sensitized Paper; How the Effects are produced; Negatives; Prints; Printing Frames; Our Printing Frame; Putting Negatives in Printing Frame; Printing; Developing; Fixing; Drying; Trimming; Fancy Shapes; Mounting. III—Negatives and How to Make Them; The Paper; Making Transparent Paper; Making the Negatives; Printed Negatives; Perforated Negatives; Negatives made from Magazine Pictures; Ground Glass Negatives. IV-Nature Photography; Aids to Nature Study; Ferns and Leaves, Photographing Leaves, Perforating Leaves, Drying Leaves, Ferns, etc., for Neg-atives; Flowers. V-Miscellaneous Photographs; Magnetic Photographs; Combination Pictures; Initial Pictures; Name Plates; Christmas, Easter, and Birthday Cards.

R6. Complete Outfit, Fun with Photography".. \$0.50

If sent by mail, postage extra

FUN WITH CHEMISTRY.

Chemistry is universally considered an interesting subject, even in school, and it is certainly an important one in these days of scientific progress. This outfit starts you at the right place and presents the ele-ments of the subject in a most inter-esting fashion. The experiments are so enjoyable that you will take pleasure in doing them over and over again, and you will want to do them for your friends. You can have a lot of fun with this set and even if you have taken advanced courses in the subject you will find something new in these experiments. The more you know about chemistry the more you will enjoy it and then you can more easily appreciate what a splendid outfit this is for the money.

The Outfit contains over twenty different articles, including chemi-cals, test-tubes, adjustable ringstand, litmus paper, filter paper, glass tubing, etc., in fact everything needed for the forty-one experiments. The book of instructions is fully illustrated and measures 5 x 74 inches.

Fun found here: From White to Black, or the Phantom Ship, Yellow Tears; Smoke Pearls; An Ocean of Smoke; A Tiny Whirlwind; A Smoke Cascade; An Explosion in a Teacup; A Gas Factory in a Test Tube; Making Charcoal; Flame Goes over a Bridge; A Smoke Toboggan Slide; Fountains of Flame; Making an Acid; Making an Akali; A Chemical Fight; Through Walls of Flame; An Artificial Gas Well; A Lampblack Factory; Steam from a Flame; The Flame that committed suicide; Chem-ical Sount A Baby Shating Rink: A ical Soup; A Baby Skating Rink; A Magic Milk-shake; The Wizard's Breath; A Chemical Curtain; Scrambled Chemicals; and many other exneriments.

No. R7. Complete Outfit, "Fun with Chemistry" \$0.50 If sent by mail, postage extra

ELECTRIC SHOOTING GAME.

Shooting Animals by electricity is certainly a most original game, and it will furnish a vast amount of amusement to all. The game is pat-ented and copyrighted—because it is

Scientific knowledge is unconsciously gained while playing these games.

really a brand-new idea in gamesand it brings into use that most mysterious something called electricity. While the electricity is perfectly harmless, there being no batteries, acids, or liquids, it is very active and you will have plenty to laugh at. is so simple that the smallest child can play it and so fascinating that grandpa will want to try it.

The "game preserve" is printed in colors, and the birds and wild animals are well worth hunting. Each has a fixed value,—and some of them must not be shot at all—so there is ample chance for skill. Tis-sue-paper bullets are actually shot from the "electric gun" by electricity, and it is surely a weird sight to see them shoot through the air impelled by this unseen force.

The Outfit contains the "Game-Preserve," the "Electric Gun," the "Shooting-Box," and the "Electric Bullets," together with complete illustrated directions, all placed in a neat box.

No. R41. Complete "Elec-tric Shooting Game," post-.... \$0.50

ELECTRIC AIR-SHIPS AND OTHER GAMES.

This is the age of air-ships and electricity, so what could be more up-to-date than electric "air-ships" that will float and dive and race around at the will of the operator? In this game Mr. St. John has again made use of a scientific principle, the air-ships being actually controlled by electricity. They are made to act in a most peculiar manner, with no wires, no fuss, no danger. They are wires, no fuss, no danger. They are under perfect control and can be made to ascend to the ceiling, drop to the floor, or race across the room as desired. You simply cannot imagine how entertaining it is to see a lot of people managing these aerial

races, each eager to win. The outfit contains illustrated directions and materials for two players, including the apparatus for produc-ing the electricity and the "repeller" for managing the "Air-ships" in mid-air. The little "Air-ships" are actually made of metal and they can be

instantly formed. Here's the latest sport for all ages, because the little ones can play too. Get into the game and be an aviator. No. R42. "Electric Air-Ships and Other Games"...... \$0.25

If sent by mail, postage

HOW TWO BOYS MADE THEIR OWN ELECTRICAL APPARATUS.

By Thomas M. St. John, Met. E. This book contains 141 pages, 125 illustrations, and directions for making 152 pieces of apparatus. Size, 5 x 75, red cloth.

Price, Postpaid \$1.00 Contents: Chapter I.—Cells and Batteries. II—Battery Fluids and Solutions. III—Miscellaneous Apparatus and Methods of Construc-tion, IV-Switches and Cut-Outs. V-Binding Posts and Connectors. VI - Permanent Magnets. VII -Magnetic Needles and Compasses. VIII—Yokes and Armatures. IX— Electro-Magnets. X—Wire-Winding Apparatus. XI—Induction Coils and Their Attachments. XII - Contact Breakers and Current Interrupters. XIII—Current Detectors and Gal-vanometers. XIV—Telegraph Keys and Sounders. XV—Electric Bells and Buzzers. XVI—Commutators and Buzzers. XVI-Commutation and Current Reversers. XVII-Reand Current Reversers. XVIII-Apparatus
VIX-Electric sistance Coils. XVIII—Apparatus for Static Electricity. XIX—Electric Motors. XX—Odds and Ends. XXI -Tools and Materials.

THE STUDY OF ELEMENTARY ELECTRICITY AND MAGNETISM BY EXPERIMENT.

By Thomas M. St. John, Met. E. This book contains 220 pages and 168 illustrations. It measures 5 x 71 inches, and it is bound in green cloth.

Price, Postpaid \$1.25 This is a text book for amateurs, students, and others who want to take up a systematic course of electrical experiments at home or in school. It will give a practical and experimental knowledge of elementary electricity, and thoroughly pre-pare students for advanced work.

For the Boy who likes to do things or make things nothing can equal Mr. St. John's Books.

THINGS A BOY SHOULD KNOW ABOUT ELECTRICITY.

By Thomas M. St. John, Met. E. The book contains 180 pages and 260 illustrations, it measures 5 x 7½ inches and is bound in cloth.

This book explains in simple, straightforward language, many things about electricity; things in which the American boy is intensely interested, things he wants to know, things he should know. It is free from technical language and rhetorical frills, but it tells how things work and why they work.

and why they work.

It is brimful of illustrations—the best that can be had—illustrations that are taken directly from appara-

tus and machinery, and that show what they are intended to show.

This book does not contain experiments, or tell how to make apparatus; our other books do that. After explaining the simple principles of electricity, it shows how these principles are used and combined to make electricity do every-day work.

REAL ELECTRIC TOY-MAKING FOR BOYS.

By Thomas M. St. John, Met. E.
This book contains 140 pages and
over one hundred original drawings,
diagrams, and full-page plates. It
measures 5 x 7½ inches, and is bound
in cloth

While planning this book Mr. St. John definitely decided that he would not fill it with descriptions of complicated, machine-made instruments and apparatus, under the name of Toy-Making, for it is just as impossible for most boys to get the parts for such things as it is for them to do the required machine work even after they have the raw materials.

Great care has been taken in designing the toys which are described in this book, in order to make them so simple that any boy of average ability can construct them out of ordinary materials. The Author can personally guarantee the designs for there is no guess work about them. Every toy was made, changed, and experimented with until it was as simple as possible; the drawings

A Boy never tires of trying the interesting experiments shown in these books.

were then made from the perfected models.

As the result of the enormous amount of work and experimenting which were required to originate and perfect so many new models, the Author feels that this book may be truly called "Real Electric Toy-Making for Boys."

THINGS A BOY SHOULD KNOW ABOUT WIRELESS.

By Thomas M. St. John, Met. E. 126 pages, 109 illustrations and diagrams. Bound in cloth. Net, \$1.00.

This book contains much practical and some theoretical information regarding the operation and explanation of wireless outfits. It discusses enough of the theoretical side to make the student sure of himself and to give a well-rounded knowledge of this most practical subject.

The Author has explained the various pieces of apparatus needed in a wireless station in such a clear manner that the student can not fail to understand how they work and why they work. The numerous drawings and diagrams simplify the discussions to such an extent that the reader will not want to skip a single paragraph.

"Things a Boy Should Know About Wireless" will be welcomed by thousands of enthusiastic people and it should find its way into every library.

A MOTOR THAT CAN DO THINGS.

"The St. John Motor No. 1" (List No. 2201) is designed for students and others who want a small motor for experimental purposes as well as for all of the work that any small motor can do. We believe this to be the best small motor made, and we know that it can be used in more ways than any other motor of equal cost ever built. It has four binding posts,—making it possible to energize the field or armature separately,—and so it can be used in circuits with reversers and rheostats for experiments. The speed and direction

of rotation can be changed at will, thus adapting it for running toys, etc. As the binding-posts are mounted upon the frame, this motor can be taken from the base for remounting and using in many other ways, and as it has a three-pole armature it will start promptly in any position. The shaft carries a pulley, and a fan can be added at any time. One cell will give a high speed, and more cells may be added according to the work it has to do.

Motor No. 1 stands 3½ inches high. It is finished in black enamel with nickel-plated trimmings,—strong and well made. With it are furnished three nickel-plated connecting-straps, which are to be used for connecting the field and armature in "series" or "shunt." So much can be done with this motor that it is simply impossible to tell it here; in fact, it is used for the basis of a whole book of 60 experiments called "The Study of Electric Motors by Experiment," and, when used in connection with the other parts of the Motor Outfits it will give a practical knowledge of motors that no other plan can give.

These motors and motor outfits have been praised by electrical experts and educators as being invaluable to students. They can do everything the big motors can do, and if used with rheostats, reversers and other apparatus in the outfits, the students will have a whole motor laboratory.

Why not get a motor that has brains and that can do tricks and experiments? Any good motor will go when you turn on the power; but that doesn't mean much when it comes to understanding things.

"ST. J." ELECTRIC MOTOR OUTFIT.

These outfits have been designed for students and others who want to do real experimental work with motors, so as to get right down to the bottom of the matter and thoroughly master the foundation principles of

These books are written from the boy's point of view.

the subject. It is simply astonishing to see how much can be learned with one of these outfits, especially if the work be done as fully detailed in "The Study of Electric Motors by Experiment." Every electrical laboratory should have one of these sets and the more you know about motors the more you will appreciate an outfit of this kind.

Don't simply read about motorsget right down to the practical part of it and experiment for yourself. Every experiment will settle an important point in your mind.

Electric Motor Outfit No. 2226X contains everything needed for sixty interesting and profitable experiments. With the improved apparatus that we now give we feel that this is the most complete set ever sold for the money. The following articles are included, packed in a wooden box:

The "St. John" Motor, fully described on another page, is well called a "Motor that Can Do Things."

The Five-Point Rheostat is used as a "starting-box" in the armature circuit and in various other ways to regulate speed.

The Eleven-Point Rheostat is used to regulate the "field magnetism," as one method of speed-regulation, and for other purposes.

The Double-Key Circuit Reverser is really a key, a two-point switch, and a current-reverser combined. On this account it can be used in many ways, shown in numerous wiring diagrams.

The Handy Current-Detector is used as a current-detector and as a device for studying the counter-electromotive force of motor while running. The Two-Point Switch is useful in quickly switching the current wherever it is needed, and for many other experiments.

The Strap Key protects the batteries and closes the circuit.

The Miniature Electric Lamp and Socket are used in the motor circuit to prove certain things and form an attractive addition to the outfit.

The Magnetic Needle in the new outfits is nickel-plated and serves as a compass for studying the magnetism of the poles, etc.

In addition to the articles mentioned above, the outfit contains a set of wires for Connections, a Box of Iron-Filings for studying lines of force, an Experimental Package containing Iron, Steel, etc., three Connecting Wires, and the Book of Instructions, called "The Study of Electric Motors by Experiment." This contains 10 chapters, 110 pages, and over 70 illustrations and diagrams. Bound in stiff paper. Batteries are not included.

THE STUDY OF ELECTRIC MOTORS BY EXPERIMENT.

Contains sixty experiments that bear directly upon the Construction, Operation, and Explanation of Electric Motors, together with much helpful information upon the Experimental Apparatus required. This book will be a great help to those who want to do real experimental work with motors. It contains 10 chapters, 110 pages, over 70 illustrations and diagrams, and you cannot afford to be without it.

No. R57C. The Study of Electric Motors by Experiment, bound in cloth...... \$0.50

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BOOKS.

Electric Instrument Making for Amateurs.—By S. W. Bottone. Price, Cloth, 75 cents. A practical book. How to Make and Use the Telephone.—By George M. Cary, A.M. Price, Cloth, \$1.00. Contains directions and working drawings for all parts of telephone construction.

PRACTICAL BOOKS ON ELECTRICAL APPARATUS. PRICE, TEN CENTS EACH.

How to Make a Dynamo.—By Edward Trevert. Full working drawings for a dynamo, will develop about & horse-power. The "Two-Light" Type.

There is wholesome fun in actually doing things, not merely reading about them.

- How to Make a Telephone.—By S. R. Bottone. Describes the making of a telephone, such as an experimenter would want, with drawings.
- How to Make an Electric Motor,— By Edward Trevert, A small motor such as can easily be made from material at hand.
- How to Make a Storage Battery.— By A. E. Watson. A good, modern storage battery, easily made and efficient.
- How to Make a Wimshurst Electric Machine, With directions for operating and a description of many interesting experiments.
- How to Make a Magneto Machine.

 —By Edward Trevert. Directions for a simple magneto from materials easily obtained.
- How to Make a Medical Coil,—By B. J. White. A simply-made medical coil which can be made easily by an amateur, but will be most effective for medical use.
- How to Make a Pocket Accumulator.

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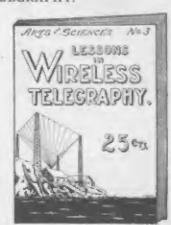
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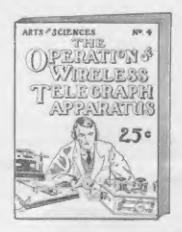
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